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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 23 JUNE, 1940 NUMBER 6

OCULAR COMPLICATIONS OF MENINGOCOCCIC MENINGITIS*

OBSERVATIONS IN 350 CASES

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According to Neal[1] the first published account of the condition described as epidemic cerebrospinal meningitis, and proved to be authentic, was that from an epidemic in Geneva in 1805. Vieusseaux[2] described the clinical picture and Matthey[3] the post-mortem findings. In America the disease first appeared in 1806, at Medfield, Massachusetts, and was described by Danielson and Mann.[4]

The earliest description of ocular complications appeared in 1842, when Toudes[5] published his observations of the Strasbourg epidemic of 1840 and 1841. He mentioned diplopia, dimness of vision, and several cases of ophthalmia. Chadouine[6] in 1844, Companyo[7] in 1847, and Daga[8] in 1851 mentioned several ocular complications. Knapp,[9] Kreitmair,[10] Salomon,[11] Jacobi,[12], Hirsch,[13] and Ziemssen and Hess,[14] about 1865, described various eye changes, especially iridochoroiditis. Wilson,[15] in 1867, recorded the eye diseases he had observed about that time in an epidemic of meningitis in Ireland. In 1887 Weichselbaum[16] described the meningococcus. Flexner[17] reported his discovery of an antimeningococcic serum in 1906.

FREQUENCY AND TYPE OF VARIOUS OCULAR SYMPTOMS

The incidence of various eye lesions and the types of these lesions vary greatly in different epidemics. This accounts for the fact that some observers—Walravens,[18] for example—considered ocular complications as rare, whereas others, such as Randolph,[19] regarded them as exceedingly common. When an epidemic is at its peak, involvement of the eyes is actually and relatively more frequent than during the early stages and the period of abatement. Table 1 shows the frequency of the various eye conditions in this series:

TABLE 1

EYE FINDINGS IN 350 CASES OF MENINGOCOCCIC MENINGITIS

Diagnosis	Number of Complications	Percentage
No ocular complications	182	55.7
Subconjunctival hemorrhage	2	.57
Conjunctivitis	18	5.1
Keratitis	3	.84
Strabismus	15	4.28
Pupillary abnormalities	20	5.7
Lens abnormalities	3	.84
Endophthalmitis	19	5.7
Papillitis	42	12.0
Hyperemia of discs and retinas	40	11.4
Simple engorgement of retinal veins	49	14.0
Amaurosis	6	1.7
Orbital cellulitis	2	.57
Nystagmus	1	.28

Gordon[20] found ocular complications in only 3.5 percent of 1,090 cases in the Detroit epidemic of 1927-1931. On the

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other extreme, Kotlarevskaia[21] reported ocular involvement in 65.3 percent of 75 cases in 1933. About 44 percent in this series of 350 cases showed some departure from normal.

The principal ocular findings of observers of several large epidemics of cerebrospinal meningitis appear in table 2.

TABLE 2

PRINCIPAL FINDINGS IN MENINGOCOCCIC MENINGITIS

Physician	Randolph	Uhthoff	Heine	Terrien and Boudier	Sinclair	Neal	McLean and Caffey	Kotlarevskaia	Lewis
Year	1893	1905	1905	1909	1919	1925	1928	1933	1939
Number of cases	40	110	100	42	128	500	136	75	350
Conjunctivitis	8	1	0	6	2	5	2	6	18
Keratitis	0	3	0	2	1	0	0	2	3
Strabismus	8	9	15	8	8	30	29	10	15
Pupillary abnormalities	19	8		30			12	14	20
Endophthalmitis	0	4	5	0	7	10	3	3	23
Papillitis	6	18	10	16			1	2	42
Hyperemia of discs and retinas	19			7					40
Nystagmus	1	8		0	0	0	14	4	1
Amaurosis	0	0		0				13	6

DESCRIPTION OF EYE LESIONS

EYELIDS. Involvement of the eyelids is evidently rare, since only a few observers have mentioned it. However, Romer[22] mentioned gaping of the palpebral fissures and diminished winking. Ballentyne's[23] experience of seeing 15 of 73 cases with retraction of the eyelids, so that the sclera was visible above and below the cornea, was most unusual. McLean and Caffey[24] mentioned staring as being quite noticeable in 6 of their 136 cases, a symptom that was probably due to this phenomenon. Ballentyne also observed hippus of the eyelid in one patient. According to Wilbrand and Saenger,[25] ptosis occurs rarely. Borovsky[26] reported 4 cases among 190 patients and Neal 4 in 500. In the author's series no abnormalities of the eyelids occurred except a temporary edema in several patients with endophthalmitis. No instance of staring was noticed. Frequently, when a patient was in coma, the eyelids were slightly open; but this finding is certainly not restricted to cases of meningitis.

LACRIMAL APPARATUS. The writer found almost no reference in the literature to involvement of any portion of the lacrimal apparatus. Even epiphora is rarely mentioned and was not present in any of this series of cases, unless the eye was acutely inflamed.

CONJUNCTIVA. Conjunctivitis is not a very frequent complication of epidemic meningitis. Uhthoff[27] reported only 1 in 110, and Neal 5 in 500 cases. On the other hand, McKee[28] reported seven cases of meningococcic meningitis with ocular complications, six of which were of conjunctivitis. Shaw[29] found conjunctivitis in 60 percent of his cases. Eighteen patients, or 5.4 percent of this series of 350 cases, had a conjunctivitis. All were mild, clearing up in from one to five days with the usual treatment for conjunctivitis. The meningococcus was successfully cultured from the conjunc-

tival sacs of six of these patients. In only half of these patients were the blood cultures positive. Nevertheless, the infection of the conjunctiva was probably blood-borne, as none of them showed lagophthalmus. Parsons[30] stated, "It [conjunctivitis] is probably sometimes endogenous in origin; in other cases, due to defective closure of the lids." However, the author believes that infection of the conjunctiva with meningococci from the nasal and oral secretions could and does occur, just as it frequently occurs in cases of common cold.

Hemorrhages into and beneath the conjunctiva are quite rare, being present in only two of the patients studied.

CORNEA. The cornea is rarely involved in meningococcic meningitis. Terrien and Boudier[31] reported two corneal ulcerations in a group of 42 cases. Wilson[32] reported parenchymatous keratitis in five cases. Uhthoff saw 3 cases of keratitis in his series of 110; Sinclair[33] observed 1 in 128. Only three patients in the present series developed keratitis. In two the condition was ulcerative and in one interstitial. In one ulcerative case, in which the lens ruptured and was extruded, exposure of the cornea from orbital cellulitis complicating endophthalmitis was the cause of the ulceration. The patient with bilateral parenchymatous keratitis also had endophthalmitis. He died on the third day of his illness. Both the blood and spinal-fluid cultures were positive, and the infection was probably endogenous. Smears and cultures in all three cases were negative.

MOTOR NERVES AND EXTRAOCULAR MUSCLES. Strabismus was comparatively rare in this series, occurring in only 15 cases, or 4.28 percent. The average percentage for eight epidemics, studied by different authors, was computed and found to be 11 percent in a total of 1,246 cases. The highest frequency of strabismus was 31.2 percent in a series of 144 cases, reported by Smithburn, Kempf, Zerfas, and Gilman.[34] McLean and Caffey reported 20 percent of 136 cases and considered strabismus the most important ocular symptom of the disease. The lowest incidence seems to be that of Lazar[35]—2.43 percent of 575 cases.

Parson's opinion was that in the early stages there is often kinetic strabismus or conjugate lateral deviation of the eyes. Uhthoff observed five conjugate deviations in 110 cases. There is little, if any, mention made of this condition by most authors. Only one case of conjugate deviation was observed in the series here described and none with kinetic strabismus. These symptoms when present are due to lesions in the cortex or in the pons.

Dunphy[36] stated that the strabismus might vary from day to day. With this the author does not agree. The strabismus is almost always paralytic and usually involves the sixth nerve. All of the 15 cases in this series were of sixth-nerve paralyses. Uhthoff's 8 cases and Lazar's 15 involved the same nerve. On the other hand, Randolph's findings were markedly dissimilar. In his series of 40 cases of meningitis he observed paralytic strabismus 8 times, all being of the divergent type. Other cranial nerves may be involved and the paralysis may be complete or partial. Total third-nerve paralysis is rare, as is also paralysis of the fourth nerve. According to Davis[37] paralysis of the fifth nerve may occur, with anesthesia of the cornea and neuroparalytic keratitis.

The prognosis in these cases of strabismus is good. Improvement usually begins with the subsidence of the meningeal symptoms. However, at times the paralysis is permanent.

Nystagmus is rarely seen, although Lichtenstern[38] commented on its frequency. Uhthoff saw 8 cases in 110, and McLean and Caffey 14 in 136 cases. It was present in only one of the author's cases. In 25 of 50 cases convalescent from meningitis, Doesschate[39] found a spontaneous nystagmus. This was certainly a most unusual observation. Heath[40] found nystagmus present in 2 patients in his series of 93 cases, studied several years after they had had meningitis.

PUPILS. The frequency with which pupillary abnormalities occur varies greatly. In 73 patients, Ballentyne found only 6 with normal pupils; 34 patients showed mydriasis and 5 miosis. Inequality was noted in 18, hippus in 31, and deficient reflexes in 7. Borovsky, on the other hand, observed only 3 cases of pupillary disturbances in 190 patients. Uhthoff found pupillary abnormalities in only 8 out of 110 cases, whereas Terrien and Boudier recorded anomalies in 30 out of 42 cases. The author saw only 20 cases, or 5.7 percent, with pupillary disturbances. They were divided as follows: anisocoria 1, mioses 3, and mydriases 16. Of the 20 patients, 14 survived and recovered normal size and reaction of their pupils.

LENS. Involvement of the lens in meningococcic meningitis is rare. Very few references to the lens were found in the literature on meningitis. In four cases of endophthalmitis in this series of 350 patients there was a temporary cloudiness of the lens which cleared up in a few days. One patient with complete blindness from bilateral endophthalmitis had no lens involvement during or immediately after her illness. She was not seen again for four years, at which time the lens of each eye had become entirely opaque.

UVEAL TRACT AND VITREOUS BODY. Involvement of these structures is best considered under the heading of

Endophthalmitis

This condition, when it occurs as a complication of epidemic meningitis, is a most interesting and important development. It has long been known and has been variously designated. Thus many authors termed it panophthalmitis, whereas others called it suppurative iridochoroiditis; still others designated it pseudoglioma, abscess of the vitreous, or metastatic ophthalmia. The most descriptive term for this condition is endophthalmitis metastatica.

Incidence: The earliest mention of this complication found in the literature was by Toudes in 1842. The condition was described clinically by several observers practically simultaneously in 1865 and 1866. Herman Knapp saw 10 of these cases, Kreitman 12, and Salomon 6. They designated the condition iridochoroiditis. Uhthoff saw 4 cases in 110, and Heine[41] 5 in 100. Romer also estimated about 5 percent as the usual incidence of this complication. Matuljak[42] reported 5 cases among 46 children from one-and-one-half to seven years of age. Lazar reported endophthalmitis in 30 patients among 575, or 5.2 percent. This appears to be the greatest number of cases of this complication ever reported. In nine patients the condition was bilateral, which brings the total number of eyes involved in Lazar's series to 39.

Among the 350 cases reported in this paper, endophthalmitis occurred in 19, or 5.7 percent, of the patients. In four the condition was bilateral. Thus a total of 23 eyes was involved. It is generally agreed that the condition occurs most frequently in children. Five of our patients were adults. The average age was 11 years. There is no relation between

the severity of the meningitis and the occurrence of endophthalmitis. The prognosis as regards life seems to be as good or better than in cases in which there is no endophthalmitis. As a rule, the condition manifested itself early in the course of the meningitis, the earliest time being the second day, the latest being the twelfth. The average was the fifth day. In four patients both eyes were involved. All four recovered, but with total permanent blindness.

Symptoms and signs: Patients who develop endophthalmitis complain very little of pain. This is partially due to the poor general condition of these patients. Only 3 in this series of 19 complained bitterly of pain. Photophobia and lacrimation were rare. Patients who were conscious and of sufficient age complained of visual loss. Usually there was a moderate ciliary injection, occasionally it was marked. In several cases the condition was discovered only during the routine examination of the eyes. Not infrequently, the eyes were normal when first examined, or showed merely an engorgement of the retinal veins. On a second examination, a few days later, the condition was found to be well developed in certain cases, or iritis or other anterior-segment changes were present; later the posterior segment also would become involved. As was previously stated, the condition usually develops early in the course of the disease—generally within the first week. Matuljak found that it appeared most frequently on the third day of the illness.

The following were the typical findings in these cases: ciliary injection of moderate degree; cornea clear and only occasionally pus in the anterior chamber; iris swollen and muddy in appearance, with posterior synechiae and often a grayish exudate behind the pupillary border; vitreous filled with an exudate or cyclitic membrane; fundus not visible; eye totally blind.

In this series of cases the tendency was to a subsidence of the involvement of the anterior chamber, whereas the changes in the posterior chamber were permanent. Several observers (Bovaird,[43] Tooke,[44] Daulroy,[45] Zweig,[46] Pillat[47]) have reported cases of iritis or iridocyclitis without involvement of the posterior segment. Iritis and cyclitis occurring alone as a complication of meningococcic meningitis must be very infrequent. Observers of large epidemics rarely report a case. In the present series there was no iritis except when it occurred simultaneously with, or was followed by, infection in the posterior segment.

The vitreous exudate varied considerably in different cases. It usually appeared first as a grayish-white membrane which, in most cases, rapidly became yellow. It was always fixed in position and was situated in the anterior portion of the vitreous, close to the posterior lens capsule. The appearance was typical of a cyclitic membrane. In several cases this exudate was distinctly funnel shaped. When the condition is bilateral it may occur simultaneously in the two eyes, or the involvement of the second eye may be deferred for several days.

Bacteriology: It is generally agreed that the mode of transmission is through the blood stream. Axenfeld[48] asserted that there was no known case of infection of the interior of the eye from the optic-nerve sheaths. According to this observer, organisms may fill the vaginal spaces of the optic nerve as far as the sclera without passing from this point into the eye.

The demonstration of meningococci within the eyeball is difficult, but has been accomplished. Thus McKee re-

corded an abundant growth of meningococci from pus in the anterior chamber taken post-mortem. Weakley[49] also reported a pure growth of meningococci from pus in the anterior chamber. Verhoeff[50] succeeded in demonstrating meningococci in the sections of an eye enucleated because of endophthalmitis complicating a meningococcic septicemia. In two cases the writer aspirated pus from the anterior chamber and succeeded in growing pure cultures of meningococci on brain-broth media.

Pathology: The findings in these cases are not characteristic of meningococcic infection but are essentially those observed in endophthalmitis due to other causes. However, the condition is seen more frequently as a complication of meningococcic meningitis than of any other disease. None of the 23 eyes in this series ended in phthisis bulbi. Shrinkage of the globe was not marked in any case and often none was evident. The pathologic findings in these cases depend on the severity of the process and also on the duration of the infection before enucleation. Haden[51] made an interesting report on the pathologic findings of an eye removed because of endophthalmitis complicating meningococcic meningitis. Metz-Klok[52] also reported the pathologic findings in one eye removed for the same condition. Both of these authors found the most extensive changes in the retina. Lazar reported the pathologic findings in two cases.

Six of the 23 eyes with meningococcic endophthalmitis in this series were enucleated. They were all sent to the Department of Ophthalmic Pathology of the Army Medical Museum in Washington, D.C. Four of these eyes have been previously described in considerable detail in the Transactions of the American Ophthalmological Society[53] for 1936. Certain changes are common to almost all cases of meningococcic endophthalmitis. Thus inflammation of the iris, ciliary body, and choroid occurred in every case examined. Infiltration of the retina, usually with detachment, was always present. Abscess formation in the vitreous, with organization, and the formation of a cyclitic membrane were constant findings.

Case Reports

Two cases not previously recorded are briefly reported here:

Case 1. R.R., a white male, aged 12 years, was admitted to the Isolation Department of the John Gaston Hospital with the usual symptoms of acute epidemic cerebrospinal meningitis. Blood and spinal-fluid cultures were positive for meningococci. On the second day of illness he complained of pain in his eye. On examination there was marked conjunctival and ciliary injection, the cornea was slightly hazy, and the aqueous turbid. The iris was swollen and adherent to the anterior lens capsule. The fundus was not visible.

The eye was anesthetized with cocaine, epinephrine, and 2-percent procaine hydrochloride. The anterior chamber was then entered at the limbus with a 22-gauge hypodermic needle attached to a small insulin syringe. The aqueous was aspirated and inoculated into a tube of warm brain-broth media. The needle was left *in situ* and the anterior chamber was filled by injecting antimeningococcic antitoxin. This was also injected subconjunctivally. The next day the eye was worse. As the pupil had failed to dilate with atropine, epinephrine was injected subconjunctivally and used also on cotton pledgets placed beneath the upper eyelid. Following this, the anterior chamber cleared a little, so that some exudate could be seen in the vitreous. The eye gradually became worse, al-

though the general condition was improving steadily.

About two weeks after the onset of the ocular infection, as the eye was totally blind and still quite painful, it was enucleated and a glass ball implanted in Tenon's capsule. Healing was uneventful and the boy was discharged to his home after 24 days in the hospital.

A pure culture of meningococci was obtained from the inoculation of the brain-broth media with the aqueous.

Pathologic Examination: This eye was examined by Captain Elbert DeCoursey of the Army Medical Museum, Washington, D.C. Photomicrographs of this eye were used in the "Atlas of ophthalmic pathology" recently published by Lieutenant Colonel Ash and Captain DeCoursey.

Macroscopic: The eyeball was of normal size and shape. The anterior chamber was shallow. The vitreous contained a cloudy exudate.

Microscopic: The cornea was infiltrated throughout with a few leucocytes. The anterior chamber was shallow, and contained much albuminous exudate with a few neutrophiles. The lens, iris, and ciliary body were pushed anteriorly. There were posterior synechiae. The spaces of Fontana were filled with polymorphonuclear leucocytes. The iris was swollen and infiltrated with polymorphonuclears and lymphocytes. The epithelium of the ciliary body was densely infiltrated with leucocytes, but the muscle showed only a few cells. The vitreous contained many leucocytes and some fibrin but there was no cyclitic membrane, such as seen in most of these cases. The retina was diffusely infiltrated with leucocytes, the greatest involvement being internal to the outer nuclear layer. The optic nerve was swollen and infiltrated with wandering cells, but the sheaths were not involved. The choroid showed very little involvement and the sclera none.

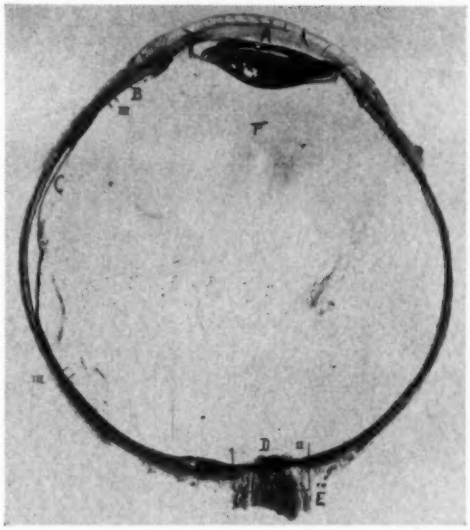

Fig. 1 (Lewis). R.R. Case 1. Endophthalmitis. A, shallow anterior chamber, filled with albuminous exudate. Lens, iris, and ciliary body pushed anteriorly. B, ciliary body and anterior portion of retina densely infiltrated with leucocytes. C, retinal detachment. D, swollen optic nerve with exudate on surface. E, nerve sheaths not involved. F, exudate in vitreous but no cyclitic membrane.

Case 2. M.W., a white female, aged 23 years, had been ill for two days with a typical case of meningococcic meningitis, when her left eye became involved. There were conjunctival and ciliary injection, irregular pupil, pus in the anterior chamber, and exudate on the anterior lens capsule. The blood culture was negative, but spinal-fluid cultures were positive for meningococci several times. Aspiration of the anterior chamber was performed, and the material cultured in brain-broth. A pure growth of meningococci was obtained. The anterior segment cleared slightly, so that exudate could be seen in the vitreous. The condition of the eye failed to improve. On the 27th day of her illness, enucleation, with glass-ball implantation, was performed under local anesthesia.

There was a mild papillitis of the right eye which gradually subsided. On discharge, six weeks after the illness began, the right eye appeared normal and the left socket had entirely healed.

Pathologic Examination: The eyeball was of normal size and shape. The cornea was normal. The anterior chamber was quite deep and contained considerable serum and a few leucocytes. The pupil was well dilated. The iris and ciliary body were moderately edematous. The pars ciliaris retinae was the site of intense purulent infiltration. Foci of wandering cells, consisting mostly of round cells, were found in various portions of the retina, but mostly in the internal layers. The choroidal vessels were dilated but no definite foci of infiltration were seen. Just behind the lens was a vitreous abscess, but no organization was taking place. There was only an occasional small area of retinal detachment. The optic-nerve sheaths showed a slight inflammatory reaction and small amount of cellular infiltration.

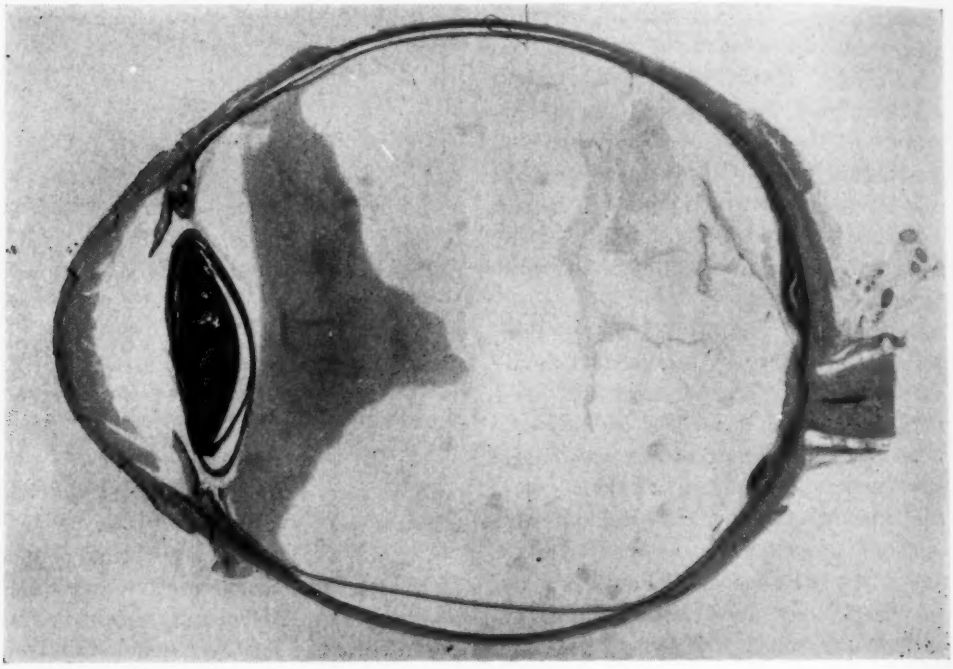

Fig. 2 (Lewis). M.W. Case 2. Endophthalmitis. Serum in anterior chamber. Vitreous abscess without organization. Only slight retinal detachment. The pars ciliaris retinae shows intense suppurative activity. Foci of leucocytes in retina.

OPTIC NERVES AND PATHWAYS. (a) Papillitis is an extremely important complication and in many epidemics the most frequent one. According to Romer, optic neuritis assumes first place among ocular complications, whereas papilledema is very rare, a statement with which most observers agree. The highest percentage of papillitis reported is that by Fairley and Stewart[54]—116 out of 184 cases, or 63 percent. This is so much higher than the percentage reported by any other observers that it makes one doubt its accuracy. Randolph found papillitis in 15 percent, Uhthoff in 16 percent, and Heine in 10 percent. Lazar

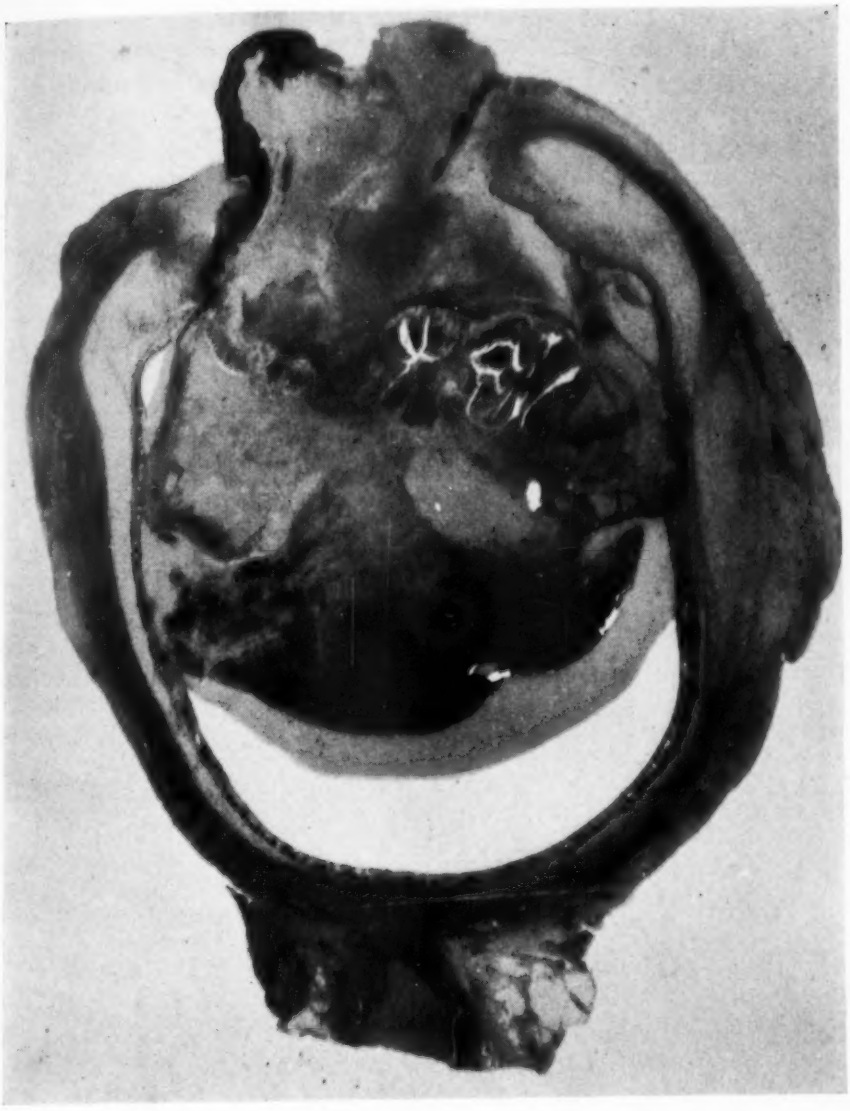

Fig. 3 (Lewis). J.P. Endophthalmitis metastatica plus panophthalmitis. Corneal rupture with protrusion of granulation tissue partially covered with prolapsed iris and ciliary body. The lens has been extruded. The retina is completely detached and disorganized. The choroid and the sclera are greatly thickened. (×7)

did not mention optic neuritis in his report of 575 cases. Probably the fundi were not examined routinely. In the writer's series of 350 cases there were 42 patients with optic neuritis, or 12 percent. Forty patients, or 11.4 percent, showed a definite hyperemia of the discs. In these cases there was dilatation of the vessels, abnormal redness of the papillae, but no elevation. Some observers might class such cases as occurrences of true papillitis. The distinction between a well-developed hyperemia and mild neuritis is difficult, as has been dis-

cussed elsewhere.[55] Davis[37] considered the appearance of the nerve head in these cases to be a characteristic "smoky" or misty type. With this the writer disagrees. Both color and appearance are similar to papillitis from other causes. The elevation of the disc is usually slight, one-quarter to three-quarters diopter. When higher, which is only very occasionally, it is usually due to increased intracranial pressure. Three patients in our series of cases developed a papilledema of from two to four diopters. One of them died, and at autopsy the ventricles were all distended with purulent exudate. In both of these cases papilledema continued after subsidence of the meningitis. Subtemporal decompressions were performed by the attending neuro-surgeons. This procedure, together with repeated cistern-punctures, succeeded in reducing the papilledema so that satisfactory central and peripheral vision was obtained in both cases.

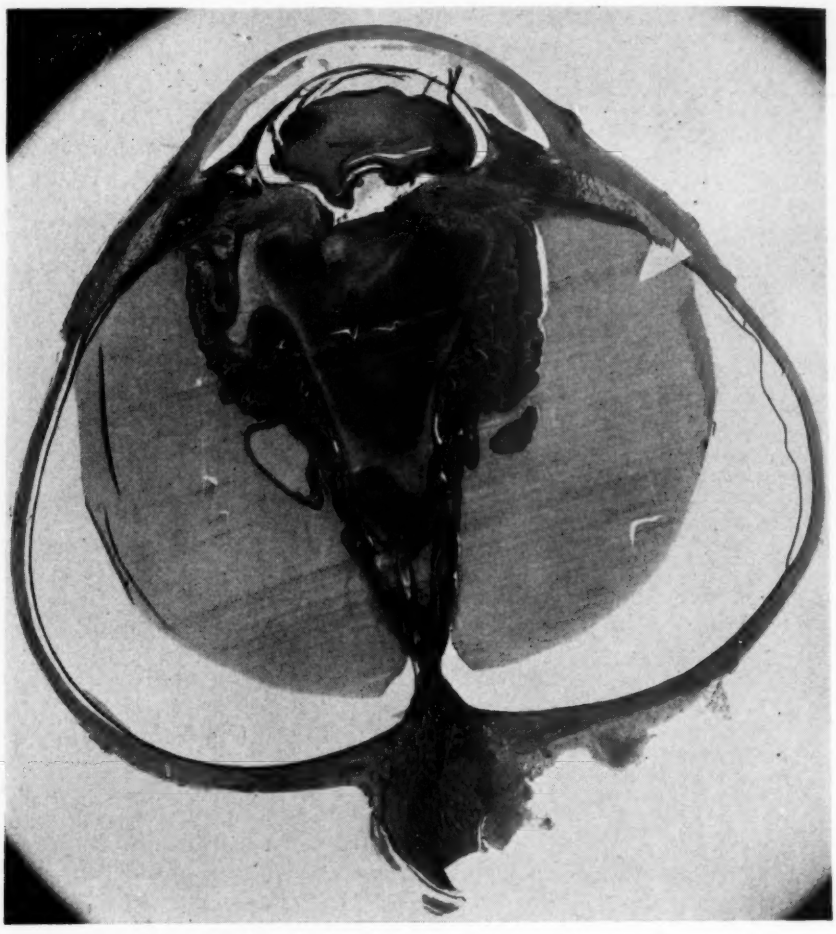

Fig. 4 (Lewis). E.H. Endophthalmitis metastatica. Dense cyclitic membrane with large abscess of vitreous. Retina completely detached with great distortion of normal structure. Choroid only slightly infiltrated. (×7)

The papillitis in meningococcic meningitis is almost always bilateral, although usually it is more marked on one

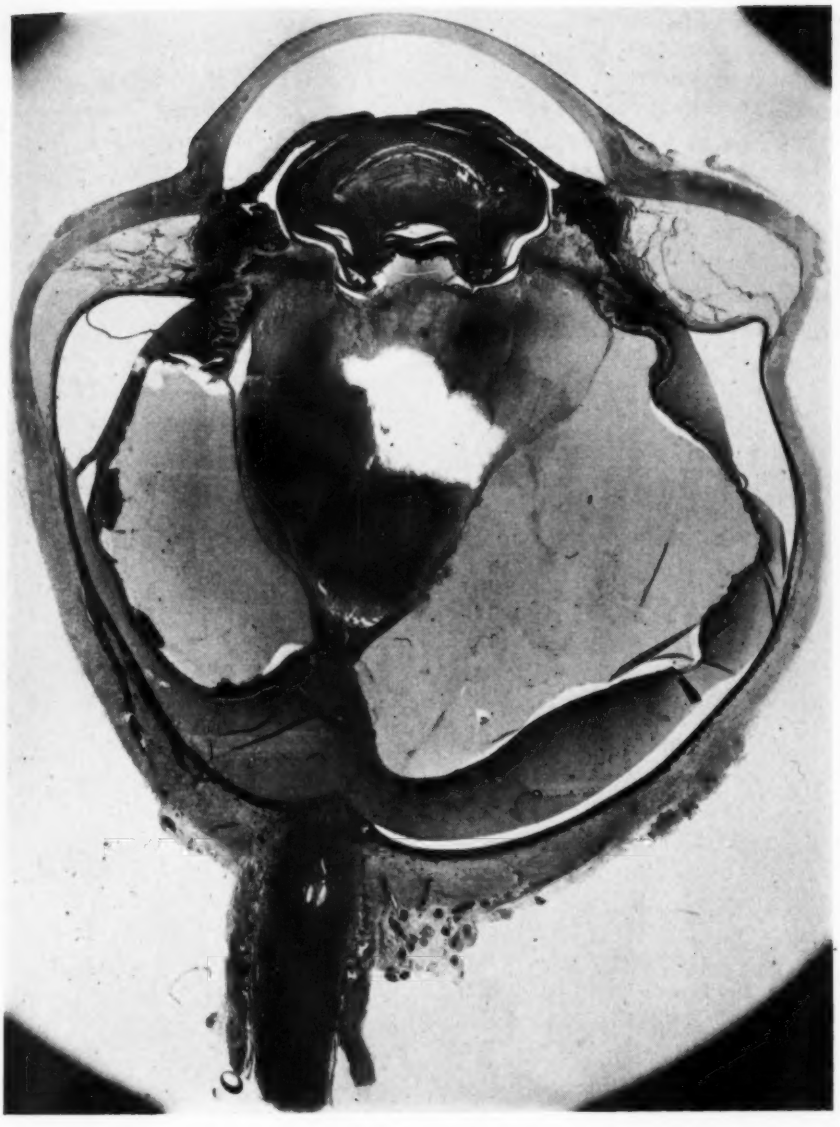

Fig. 5 (Lewis). L.W. Endophthalmitis metastatica. Posterior synechiae. Vitreous abscess and cyclitic membrane. Complete retinal detachment with great infiltration and disorganization anteriorly. Choroidal detachment anteriorly and partial separation of ciliary body. (×7)

side than on the other. Like other ocular complications, it occurs early in the course of the disease and reaches its height in the second or third week. Gradual subsidence occurs as the patient recovers. Often there is a partial secondary optic atrophy which makes its appearance several weeks later. Sector-like defects in the visual fields were not unusual.

Optic neuritis may develop from the pressure of exudate within the vaginal sheaths or indirectly from the pressure of distended ventricles. Usually, however, the condition is a perineuritis. Direct continuity of inflammation from the

meninges to the nerve sheaths has repeatedly been demonstrated. According to Parsons it is uncertain whether the perineuritis is due to the presence of microörganisms or to toxins alone.

(b) Amaurosis. Several observers have reported blindness in meningitis with normal fundi. Parsons stated that he had frequently seen complete amaurosis with normal pupillary reactions, pointing to the action of toxins on the higher visual centers. Kotlarevskaia, in his series of 75 cases, reported 13 children who were blind but had normal fundi. Many observers saw no cases of amaurosis. The writer encountered six patients whom he believed to be blind and who had normal fundi. It is very difficult to ascertain whether patients in such cases are really blind or are simply stuporous. This is particularly true of infants, and it is in infants that most of these cases have been observed.

Most authors state that in their cases of amaurosis the pupils react to light normally, thus indicating involvement of the higher visual centers. In most of the cases of the present series the pupils did not react to light. In one case, which has been reported elsewhere,[53, 55] there was a marked optic-nerve atrophy several months later and also binasal-

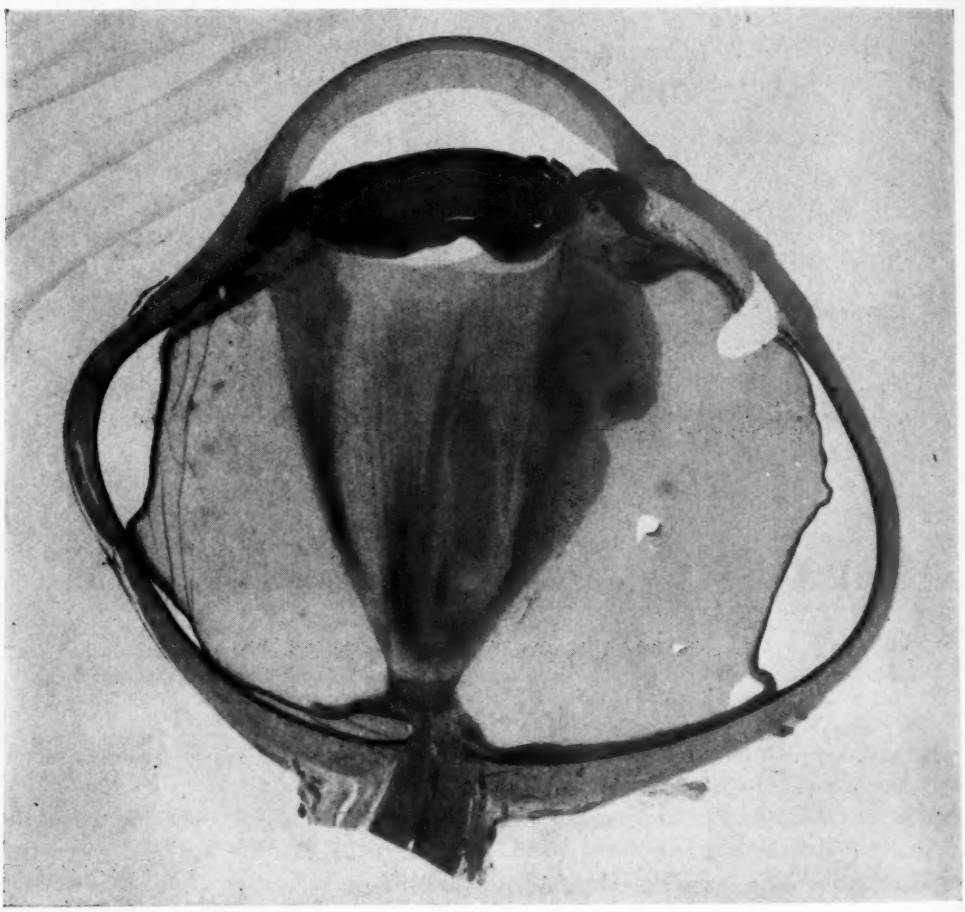

Fig. 6 (Lewis). I.M. Endophthalmitis metastatica. Deep anterior chamber containing serum. Iris thickened with posterior synechiae. Vitreous abscess and cyclitic membrane. Retinal detachment anteriorly and around the papilla. (×7)

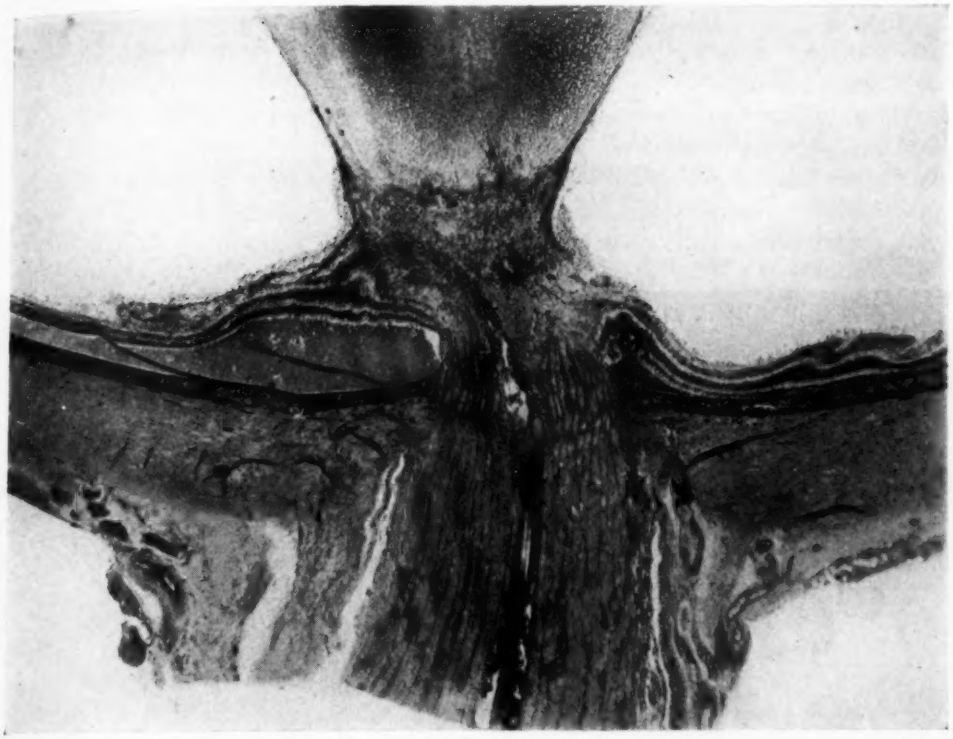

Fig. 7 (Lewis). I.M. Endophthalmitis metastatica. Peripapillary detachment of retina by albuminous fluid. Posterior end of vitreous abscess. Thrombosis of central artery and vein.

quadrant field defects. These findings indicate that the lesion was in the optic chiasm rather than in the cortex in this particular case. Probably the pathologic condition was an intense neuritis. Involvement of the higher visual centers is usually considered to be the cause of the amaurosis which complicates meningococcic meningitis.

RETINA. Retinal involvement alone was not seen in any of the cases here reported. Every severe papillitis was surrounded by an area of swollen retina. In all severe cases of metastatic endophthalmitis there is serious retinal involvement. Usually the retina is greatly swollen, with foci of intense leucocytic infiltration and either areas of separation or complete detachment.

Hyperemia of the retina and discs has already been discussed. It probably represents an early stage of what may become a neuroretinitis. Early and effective treatment undoubtedly frequently prevents the papillitis from developing.

Engorgement of the retinal veins, making them seem not only larger but darker than normal, was observed in 14 percent of the patients in this series. Apparently it was of no particular significance.

Thrombosis of the central vein has been only rarely observed as a complication of meningococcic meningitis. Randolph reported one case in a 20-month-old infant. Michel[56] reported seven cases, all in adults, from 51 to 81 years, and all had vascular sclerosis.

In this series of 350 cases one patient with metastatic endophthalmitis was found, on microscopic examination of the enucleated eye, to have had a recent thrombosis of both central vessels.

TREATMENT OF EYE COMPLICATIONS

The external ocular complications, such as conjunctivitis and keratitis, should be treated by the methods usually employed for these conditions. Iritis demands the frequent use of atropine, epinephrine, neosynephrine, or some similar mydriatic. As the iritis is usually a part of an endophthalmitis, it becomes necessary to consider the treatment of that condition. Unfortunately, endophthalmitis is usually hopeless. However, Lazar[35] has reported two cases and the author[53] one case with mild endophthalmitis in which recovery took place, with normal vision. The injection of antimeningococcic serum or antitoxin intraocularly has been tried by the writer and by other observers. Apparently it is without any definite value. The same seems to be true of local instillations of subconjunctival injections of the serum, or antitoxin. Certain authors—Zarzycki,[57] for example—disagree with this. Netter[58] also recommended the intraocular injection of antimeningococcic serum; in two cases, with an apparently mild endophthalmitis, there was recovery after he had injected the serum directly into the vitreous.

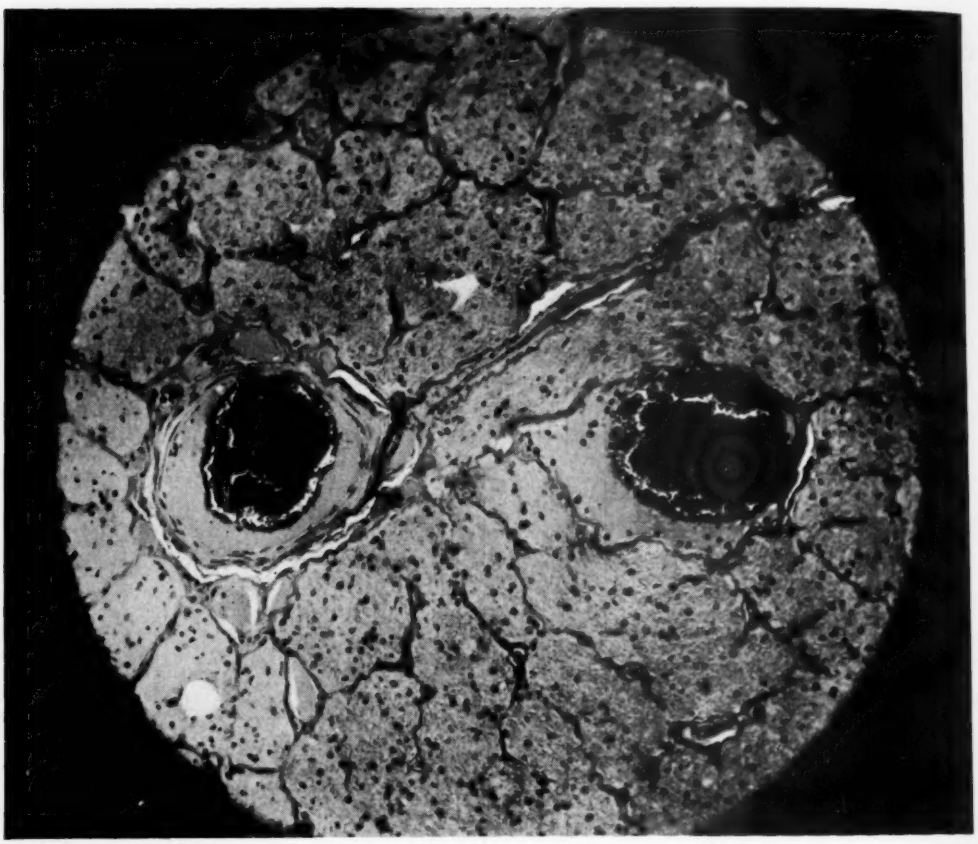

Fig. 8 (Lewis). I.M. Endophthalmitis metastatica. Cross-section of optic nerve. Recent thrombus in both artery and vein. (× 1142)

For the past few years patients with meningococcic meningitis have been treated with antimeningococcic antitoxin instead of serum. The initial dose is usually 100,000 units administered intravenously. It has proved to be superior

to the older serum. Since 1937 sulfanilamide has been extensively used in epidemic meningitis and with good results. Large doses must be used. In the Isolation Department of the John Gaston Hospital in Memphis, where the study of this series of cases was made, Dr. Gilbert Levy, director, employs the following doses: For the average adult a dose of 100 grains is administered orally as soon as the patient is seen. A Levine tube is used if the patient is unconscious or irrational, as is usually the case. It is followed by the administration of 20 grains every four hours. Children and infants are given proportionally smaller doses. A complete blood count is made every day. Marked reduction in the blood count or in hemoglobin demands reduction in dosage or complete omission of the drug. Several patients have been cured by this drug without the use of antitoxin or serum. However, the best method of treatment seems to be to administer a combination of antitoxin intravenously, and sulfanilamide by mouth. Lumbar puncture is no longer a necessary procedure every day or even twice daily as was commonly done a few years ago, because the intraspinal injection of serum is no longer used. Recovery is much more rapid and the number of complications much fewer than before the advent of antitoxin and sulfanilamide therapy.

Every patient with meningococcic meningitis should be examined by an ophthalmologist as soon as the diagnosis is made or suspected. At frequent intervals during the course of the disease the eyes should be inspected and the fundi examined. This is especially valuable in cases of papillitis and of the much rarer papilledema. In these conditions an increasing elevation of the disc will serve as an important guide to the attending physician as to the frequency of repeating lumbar or cistern punctures. Failure of a papilledema to subside promptly may demand an immediate subtemporal decompression. Severe or even complete optic atrophy may thus be avoided in certain cases. Frequent examinations will detect involvement of the conjunctiva, cornea, uveal tract, and other structures at an early stage, when appropriate treatment is most effective.

Summary

The eyes of 350 patients with meningococcic meningitis have been examined over a period of nine years. Repeated examinations were made when indicated. The findings of numerous other observers are given as well as those of the author. Each structure of the eye is considered separately and its complications described. Any of the structures of the eye may be involved, and very occasionally all are affected. In this series of 350 cases, 44 percent showed some deviation from the normal. Deducting 14 percent, which showed only an engorgement of the retinal veins, there remain 30 percent with definite pathologic changes. The most frequent complication in this series was papillitis. Papilledema was quite rare.

Metastatic endophthalmitis was the most spectacular and also the most disastrous complication. Photomicrographs of several eyes enucleated for endophthalmitis, with a brief description of the pathologic findings, have been included.

The modern treatment of meningococcic meningitis by antitoxin and sulfanilamide is recommended, but not described in detail. Frequent ocular examination of all cases is urged.

The author wishes to express his thanks to the staff of the Ophthalmic Department of the Army Medical Museum in Washington, D.C., for their assistance in the pathologic study of the eyes enucleated for endophthalmitis.

Exchange Building.

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STUDIES ON THE INFECTIVITY OF TRACHOMA*

X. Frequency and distribution of the inclusion body and its possible relation to pathogenesis

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The balance of the evidence† originating from different laboratories on the etiology of trachoma designates a virus as its causative agent. Among other characteristics indicative of viral activity is the cytoplasmic inclusion body identified with the epithelial cells of the conjunctiva and, occasionally, even of the cornea. While opinion varies as to its true significance, the majority of observers, beginning with Prowazek and Halberstaedter,[2] the discoverers, regard the inclusion body as actually the incitant itself, or, more correctly, as a mass or "colony" of infectious units. However, the evidence brought forward during all these years in support of this belief remains essentially morphological, and as such it is subject to individual interpretation. In the meantime, it must be admitted that whatever its ultimate nature may be, the inclusion body constitutes an integral part of trachoma, and, from the microscopical point of view, it is still the only tangible characteristic of the entire disease. It is not to be wondered, therefore, that investigation returns cyclically to this structure, thus contributing to a literature perhaps as extensive as that of any phase of trachoma (see ref. 1).

As the studies on etiology progressed in this laboratory, it became increasingly obvious that a detailed investigation of the inclusion body could not long be avoided, and that its possible relation not only to trachoma, but to other inclusion-bearing conjunctivitides, would eventually demand clarification. Accordingly, pertinent data have been collected over the past nine years without an attempt at analysis in the interim; now they are numerically sufficient to afford a working basis for statistical evaluation and signification. It is for this reason that the present communication appears justified.

The various techniques, the methods of observation, animal inoculation, and so on, have been described both in preceding papers and in a recent monograph[1] so that they need not be repeated at this time. The study to be reported upon was made on 602 patients with trachoma,‡ representative of the different stages and manifestations of the disease; of these, 81 were Indian, 78 Navajo and 3 from Oklahoman tribes. The remainder were whites residing in Missouri, Kentucky, Tennessee, West Virginia, Georgia, Oklahoma, and Illinois. The large majority of the patients, however, were seen at the Trachoma Hospital, Rolla, Missouri, and in the ophthalmological clinic of this university. A number of varied observations have been made on these patients, as will be described in the body of this report.

* From the Department of Ophthalmology, Washington University School of Medicine. Conducted under a grant from the Commonwealth Fund of New York.

† For a comprehensive review on the subject of inclusions the reader is referred to chapter VI of reference 1.

‡ Grateful acknowledgment is made to the following physicians for coöperation in obtaining patients and material: Drs. C. E. Rice and J. E. Smith of Rolla, Missouri; Robert Sory of Richmond, Kentucky; P. E. Faed of Ganesboro, Tennessee; B. C. Welch of Bainbridge, Georgia; A. F. Lenzen of the Illinois Trachoma Eradication Program; P. D. Mossman, J. F. Lane, and W. P. Whitted of the U. S. Indian Service; and L. T. Post of Washington University.

Comparable, but less extensive, examinations were carried out with individuals suffering from other diseases, as inclusion blennorrhea, swimming-bath conjunctivitis, vernal catarrh, folliculosis, and follicular conjunctivitis of undetermined origin.

Observations and interpretations

After assembling the data for this report, the disjointed nature of the different observations became immediately obvious. It was, therefore, decided to present what information has accrued as separate and distinct topics, finally bringing each into proper perspective in a general discussion. It will be realized that some of the observations to be reported repeat and extend those of other workers, but, in addition, certain results will appear for the first time in the literature.

Occurrence of inclusions in trachoma. While numerous communications record the finding of inclusion bodies in trachoma with a frequency varying from 0 percent to 100 percent of the patients examined, it was nevertheless necessary to obtain similar statistics, if only to establish a standard for comparison and to acquire a personal background and knowledge for extension of the study into the different relationships since pursued. Thus, then, conjunctival scrape smears were made from 602 patients, the clinical stages of whom will be considered presently. The smears were stained in the usual way with Giemsa or Wright, and the figures to be given indicate the results of single observations. In some patients repeated preparations were made, but these were for a different purpose. Of the 602 patients observed, 197 were found to have inclusion bodies on the one examination. This means that on the basis employed 32.7 percent, or approximately 1 of every 3 patients, harbored inclusions. It is interesting that in a recent analysis made by the writer[1] 42 reports were reviewed in this specific connection. A grand total of 5,777 patients were recorded from various countries of the world, with inclusions occurring in 1,784, or 30.8 percent. The close approximation between the present and the composite incidence of inclusions in trachoma requires no further comment.

Speaking in general terms, it may be said that for the most part the inclusions observed were composed of initial bodies, the larger, heterogeneous, basophilic component. In the more recent cases, however, the elementary body, the smaller, homogeneous, acidophilic constituent, appeared to be more common. Inclusions occurring as mixtures of both elements were also seen more frequently in earlier cases. Unfortunately, it was not possible to make accurate determinations on the relative occurrence of initial and elementary bodies because, too frequently, insufficient numbers of inclusions were found in the different preparations. Occasionally, clusters of initial or elementary bodies were seen extracellularly, in some instances obviously discharged from an adjacent, ruptured epithelial cell.

It is important to add that apparently only the rarer preparations contain moderate numbers of inclusions. When examining patients at random, the general experience is to find few inclusions, frequently only one or two on a whole slide. It is this fact that renders figures of relative proportions not only difficult to obtain, but also inaccurate. In very early infection, however, inclusions may be more numerous, and from time to time even profuse, but such examples are rare. Indeed, these are the preparations that are reserved for future display.

An interesting observation has been the comparison of both eyes of a patient in respect to inclusion bodies. Thus, 38 individuals with approximately the same degree of clinical activity in both eyes were found to have inclusions in one eye

and not in the other. Even without making allowance for patients with monocular disease, or for individuals in whom one eye was considered clinically inactive at the time of examination, this means that at the very least 1 of 5 patients with inclusions may show inclusions not in both eyes, but only in one. It, therefore, seems a safe precaution in rendering diagnosis to obtain preparations from both eyes.

Occurrence of inclusions in other conjunctivitides. While there was a great deal of confusion in the past on the occurrence of inclusions in other ocular conditions and, in fact, even in the normal conjunctiva, the present opinion is that they may also occur in inclusion blennorrhea and swimming-bath conjunctivitis. As the opportunity presented itself preparations have been made from patients with a large variety of conjunctival manifestations. It may be said at the outset that throughout repeated examinations in a large number of acute and subacute bacterial infections, inclusions were never found. Because, however, the different follicular conjunctivitides may be confused with trachoma, an effort has been made to obtain for tabulation as many observations as possible in such cases. Such data obtained in this laboratory are submitted in summary form in table 1. Analysis of the protocol reveals the following information: (1) as already stated, 197 of 602 patients with trachoma showed inclusions; (2) 42 of 42 infants with inclusion blennorrhea and 14 of 14 individuals with swimming-bath conjunctivitis also yielded inclusions; (3) in vernal catarrh, 1 of 13 patients revealed inclusions, but, since the clinical manifestation was concurrent with trachoma, it is reasonable to regard the observation as an expression of the latter disease; (4) on the other hand, inclusions were not found in 41 children with folliculosis nor in 12 patients with chronic conjunctivitis of undetermined etiology. Thus it is seen that, of the conditions studied, inclusion bodies were found only in inclusion blennorrhea and swimming-bath conjunctivitis.

TABLE 1

FREQUENCY OF EPITHELIAL INCLUSIONS IN DIFFERENT FOLLICULAR CONJUNCTIVITIDES

Disease	Number of Patients		Percentage of Incidence
	Examined	With Inclusions	
Trachoma	602	197	32.7
Inclusion blennorrhea	42	42	100
Swimming-bath conjunctivitis	14	14	100
Vernal catarrh	13	1*	0
Folliculosis	41	0	0
Follicular conjunctivitis (undetermined etiology)	12	0	0

* In this instance, the patient's condition was mixed trachoma and vernal catarrh.

The low frequency of inclusions in trachoma as compared with inclusion blennorrhea and swimming-bath conjunctivitis is readily explainable. In the latter condition, the onset is sudden and acute, which must mean that the virus multiplies more rapidly than in trachoma. In addition, the sudden severity of the conjunctivitis causes the patient to seek attention without delay, thus allowing earlier study of the epithelial cells. Also, it may be for the same reasons that inclusions in these conditions are much more numerous than in trachoma, thus making them more easily demonstrable. As the diseases progress, however, it becomes apparent that inclusions are increasingly difficult to find, so that frequently by the end of the second week of infection the inclusions may have disappeared entirely. Consequently,

if inclusions are sought for during the so-called chronic stage of these conditions, the same difficulty and low frequency may be encountered as characterize trachoma.

systematically from various aspects. It was not possible to include all 602 patients in these calculations, since some of the necessary information was lacking; in each case, however, there was a sufficient number of individuals to give the data statistical value. Thus, the presence of inclusions has been studied in reference to the age of the patient in 342 individuals.

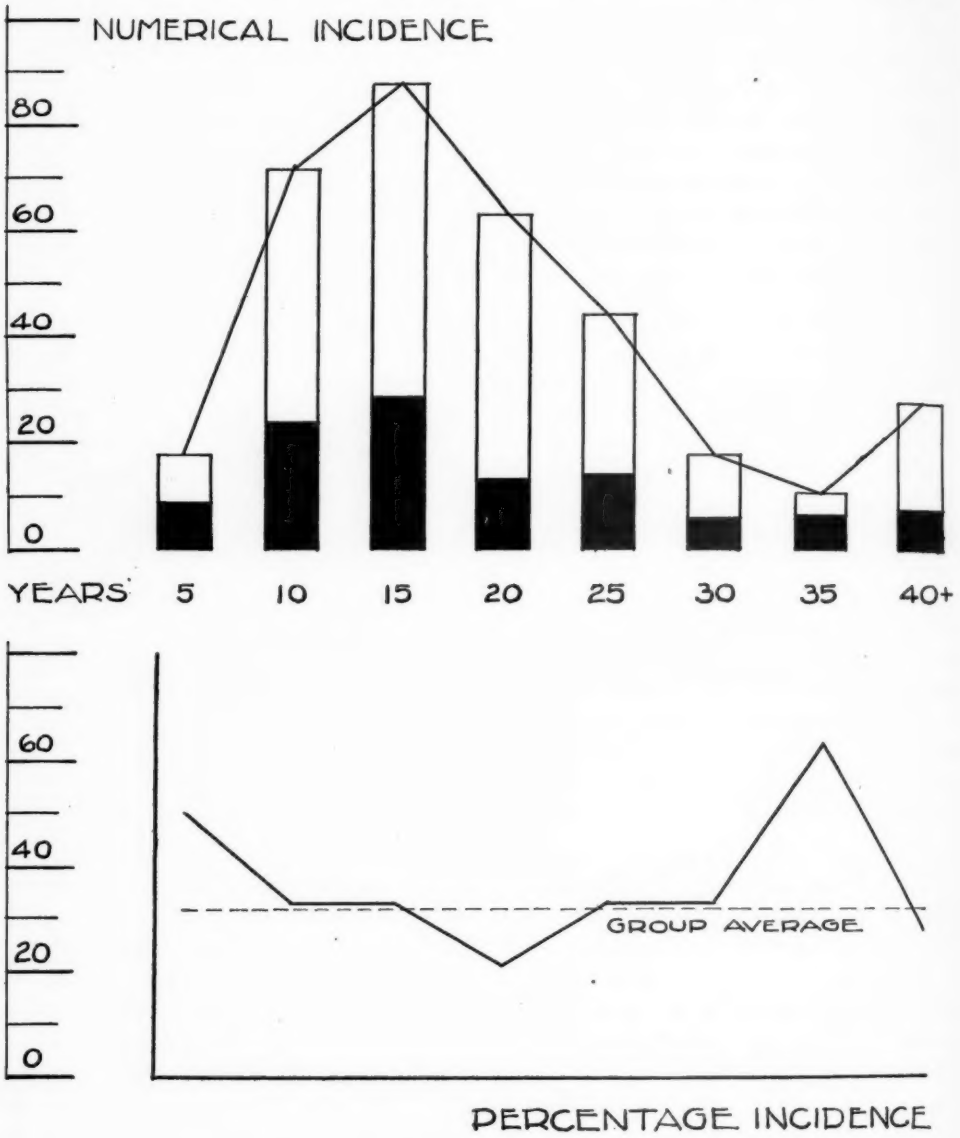

Fig. 1 (Julianelle). Relation of inclusions to age of patient.

Distribution of inclusions in trachoma. In an attempt to discover any possible interrelationships between the presence of inclusions and other concurrent factors, the patients observed have been analyzed

The results of the analysis have been summarized graphically in figure 1. The patients have been divided numerically by age in 5-year periods up to 40 years, and beyond that point all the remaining patients were considered together. Each column represents the total number of patients in the group, the shaded area indicating those with inclusions and the unshaded area those without inclusions. The graphs below the columns give the percentage incidence of inclusions for each group and they illustrate more clearly the actual relationships. A glance at this graphic arrangement suffices to prove that the age of the patient has no bearing on the presence or absence of inclusions. Incidentally, it will be noted that the curve drawn from peak to peak in each column demonstrates the incidence of trachoma by age. It is interesting to point out that the rate of trachoma rises abruptly from infancy to reach a peak by the fifteenth year of life; at that point the rate descends gradually with each succeeding quinquennial to senescence. It is seen, therefore, that trachoma is essentially a disease of adolescence, as has been pointed out by various authors; and that more than half the disease occurs in children up to 15 years of age. This observation compares favorably with similar statistics recently reviewed on more than 15,000 patients collected from the literature.[1]

So, also, utilizing the complete series of patients, the presence of inclusions has been compared with the sex of the individual and, as might be expected, these two factors are independent of each other. Another analysis was based on a comparison of the anatomical variations of trachoma and the presence of inclusions. Thus, neither the follicular nor the papillary variety of trachoma has any bearing on the inclusion body. There is, however, a sharp decrease in inclusions with the appearance of cicatrization, but this indicates the influence of another factor which will be dealt with later.

Several authors have made a study of monocular trachoma, attempting to explain this aberrant condition on a high degree of localized immunity in the unaffected eye. Von Rötth,[3] in particular, examined both eyes of monocular patients for inclusions and concluded that inclusions were present only in the affected eye. Of the patients observed in this study, 11 presented genuine unilateral disease. An examination of preparations from both eyes revealed the absence of inclusions in each normal eye, while 6 of the 11 diseased conjunctivae contained typical inclusions. This observation suggests that inclusions occur only in infection, and then their presence is subject to the same variations observed in bilateral disease.

The data on 391 patients were subsequently reassembled to bring out the possible influence of the duration of trachoma on the presence of inclusions. The material utilized in this analysis is also represented graphically in figure 2, in the manner adopted in figure 1. The different patients have been grouped arbitrarily as to duration of the disease, representing intervals of 0 to 6, 7 to 12, 13 to 18, 19 to 24 months, and 2 to 5, 5 to 10, and 10 or more years. A special group was made of patients suffering recurrences of trachoma, all, however, within 3 to 4 months following the original exacerbation. A study of the statistics suggests a striking relationship between the occurrence of inclusions and the age of the disease. There can be no question from the data summarized that inclusions are considerably more frequent in recent infection. Thus, of 116 patients suffering up to 6 months with trachoma, 65, or 56 percent, yielded inclusions on examination. In other words, about half the inclusions observed in the entire group (124) were found in these patients, who comprised less than a third

of the complete series. The curve of incidence for the different groups of patients decreases from this point in almost a straight line to trachoma of 10 years' has a marked influence on the incidence of inclusion bodies.

The final analysis submitted in figure 2 was made on the basis of recurrent dis-

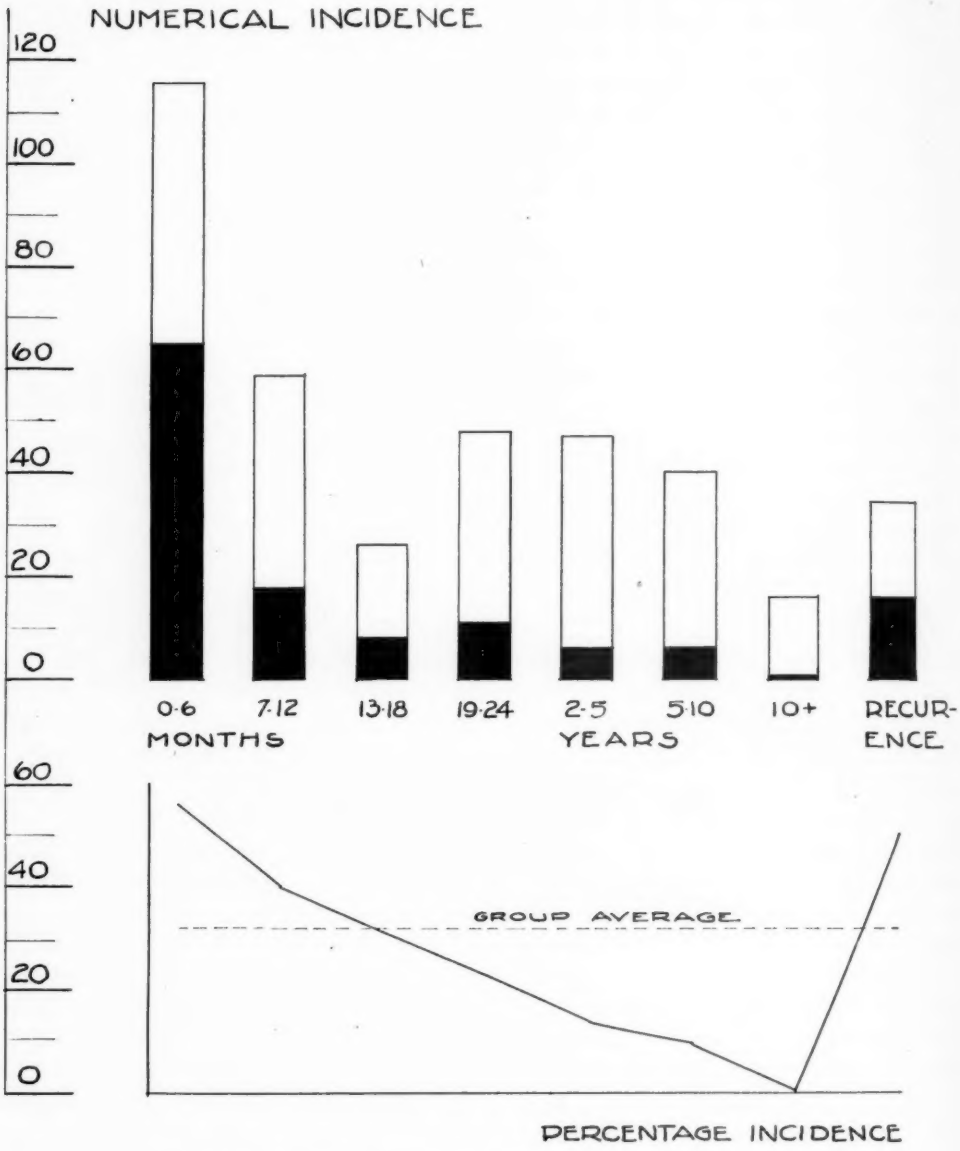

Fig. 2 (Julianelle). Relation of inclusions to duration of disease.

standing, when inclusions are practically non-existent. This observation confirms in the principle the results of a similar study by Rice.[4] The conclusion is inevitable, therefore, that the duration of the disease ease as compared with primary or prolonged trachoma. There were 34 individuals in the present series with exacerbation following varying periods of clinically quiescent infection. Of these,

16, or 47 percent, showed inclusions, a figure which almost equals the percentage incidence in disease under 6 months. Consequently, it seems that, as far as inclusions are concerned, recurrent trachoma behaves as a recent primary infection. This corroborates a conclusion arrived at by experimental procedure in earlier studies,[5, 6] that trachoma does not stimulate effective antibody response, and that in any case whatever immunity may accompany the infection, it must be of exceptionally short duration.

The declining rate of incidence of inclusions with continuance of the disease possibly explains their absence in cicatricial trachoma. Formation of scar tissue is usually a prolonged process, frequently occurring after inclusions have disappeared.

Earlier in this study, it was expected that in the more clinically severe variety of infection, inclusions would be found more frequently. A number of cases with massive hypertrophy of the lids, as well as excessive corneal involvement, however, failed to yield inclusions after diligent search. In going over the data with this approach in mind, it has been found that the severity of active infection does not predict the presence of inclusions. In illustration of this belief, there are three examples that immediately suggest themselves. These patients were affected in only one eye when first examined, but preparations were made from the unaffected eye every 2 or 3 days during an indefinite period of observation. Each of these individuals contracted trachoma of the normal-appearing eye within 2 to 3 weeks after the first examination, but interestingly enough the inclusion body was the first tangible sign of infection, preceding any thickening or follicle-formation of the conjunctiva. Similar examples are cited by Rice.[4] In such cases, moreover, it may well be that the rate of growth of the virus is comparatively accelerated at this stage and the tissues have not had sufficient time to respond with hypertrophy or folliculosis.

Relation of inclusions to infectivity. In one of the earlier communications from this laboratory[5] the observation was reported that trachomatous tissues with inclusions frequently failed to infect monkeys and, conversely, tissues without inclusions were capable of inducing the experimental disease in a certain number of animals. From the insufficient data available at the time, it appeared that infectivity of a given trachomatous tissue was not dependent upon nor related to the presence of inclusions. With the accumulation of considerably more data, it seemed profitable to restudy the possibility of this relationship. For this purpose the different experiments on infectivity were first grouped by single patients whose tissues contained inclusions and were subsequently inoculated individually into monkeys. In the second group, monkeys were inoculated with tissues from single patients in whom inclusions were not demonstrated. The final group comprised the animals inoculated with tissues pooled from different patients, some with and others without inclusions. In every case, only those experiments are considered in which the tissues suffered no alteration other than that necessary in performing grattage. Other experiments were conducted with tissues altered by filtration, chemicals, physical agents, testicular passage, and so on, but they are excluded from this analysis as being potentially, if not actually, unreliable.

The figures pertinent to these experiments have been arranged in figure 3 in the form of graphs, as in the preceding observations. The same data are also submitted in table 2. Thus it will be seen that 70 monkeys were inoculated with individual tissues from 37 patients, all containing inclusions. Typical infection occurred in 35, or 50 percent of the animals

tested. On the other hand, 158 monkeys were inoculated with separate tissues, apparently lacking in inclusions, from 112 patients, and of these animals, 35, or 22 percent, were infected specifically. The pooled tissues were derived from 89 patients, of whom 44 were found to have inclusions. The pooled material was inoculated into 106 monkeys and of these, 41, or 38 percent, were infected. The curve representing the percentage of infections under each condition forms almost a straight line, the tissues with inclusions inducing most infections (50 percent); the tissues without inclusions, least infections (22 percent); and the pooled tissues, some containing and others lacking inclusions, occupy approximately an intermediate position between the two extremes (38 percent). It may be purely fortuitous, but it is nevertheless interesting that the pooled tissues were to all

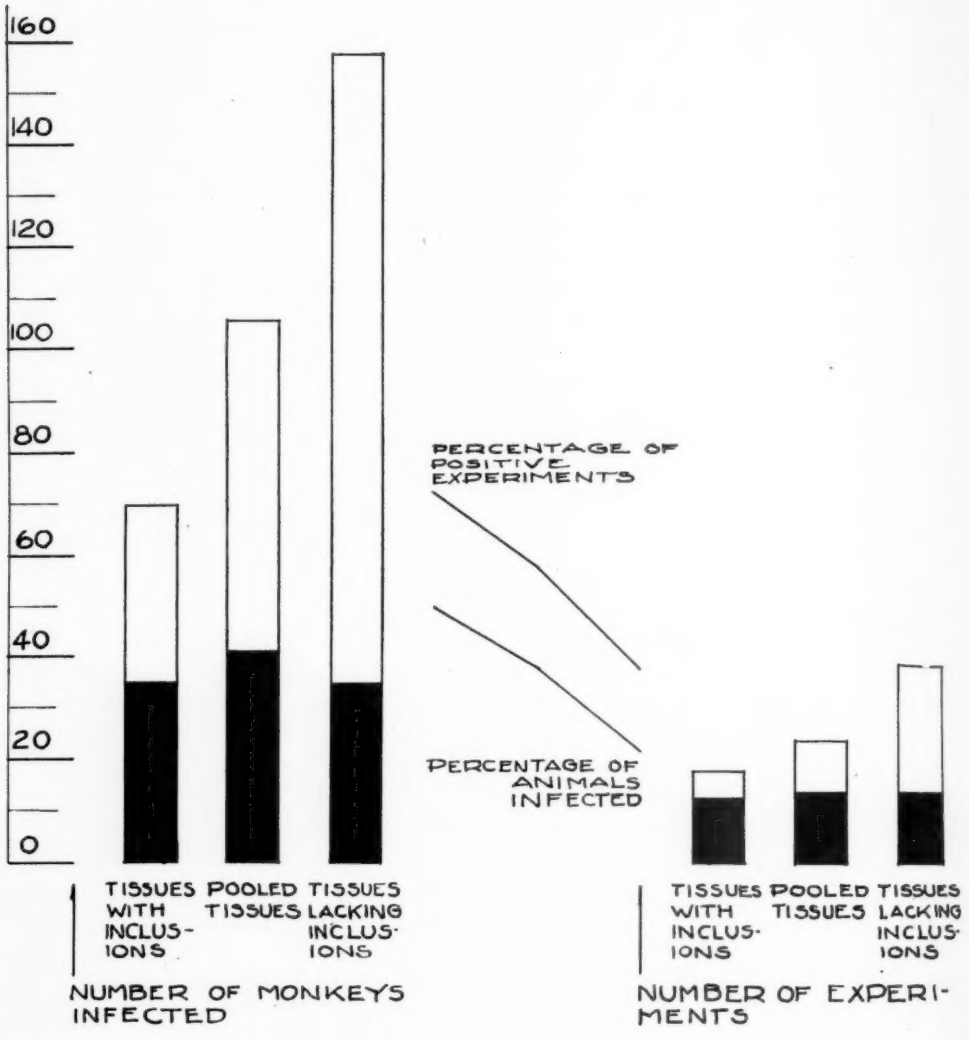

Fig. 3 (Julianelle). Relation of inclusions to pathogenesis.

intents and purposes equal mixtures of material containing inclusions and material deficient in inclusions, and that at the same time they should assume an almost mathematically half-way position in infectivity between tissues containing and those lacking inclusions. The result, however, must remain speculative as to whether it is an effect of dilution rather than chance.

The interesting and surprising outcome of the above experiments was so important that it became desirable to determine whether the same conclusions were approachable on some other basis. Accordingly, the data were reassembled as individual experiments rather than individual animals. The new values were then plotted as before and they are given in figure 3. It will be seen that 18 experiments were performed with tissues containing inclusions, and 13, or 72 percent, were considered positive (that is, animals were specifically infected); 42 experiments were conducted with material lacking inclusions, and 14, or 33 percent, were positive. Of 24 experiments with mixed tissues, 14, or 58 percent, were positive. Here, again, the curve representing the percentage of successful infections in each experiment is practically a straight line, with the upper extreme occupied by the experiments on tissues with inclusions, the lower extreme by experiments on tissues without inclusions, and the experiments with pooled tissues attain an almost half-way position. As can be observed, the curve depicting the percentage of animals infected and the curve for percentage of positive experiments run a remarkably parallel course.

It seems, therefore, that while a former observation from this laboratory is correct in that material without demonstrable inclusions may cause genuine experimental trachoma in monkeys, the statement is not inclusive enough. The present analysis with the extended series of tissues and experiments now available indicates clearly that material with inclusions appears to have approximately twice the infective capacity of material without inclusions. Furthermore, there is a suggestion requiring further elaboration before final acceptance, that possibly the degree of infectivity of tissues with inclusions is decreased proportionally as inclusion-free tissues are added to the former.

TABLE 2

COMPARISON OF INFECTIVITY OF TRACHOMATOUS TISSUES AND INCLUSIONS

Material Studied	Number of Experiments	Number of Patients	Number of Monkeys	
			Inoculated	Infected
Tissues with inclusions	18	37	70	35
Mixture of inclusion-free and inclusion-bearing tissues	24	89 (44 with, 45 without inclusions)	106	41
Tissues without inclusions	42	112	158	35

Occurrence of inclusions in monkeys. Closely allied to this phase of the study is the occurrence of inclusion bodies in experimentally infected animals. It is true, as pointed out elsewhere,[1] that the appearance of inclusions in experimental infection in man is the rule. A recent analysis[1] reveals 74 reports on transmissibility of trachoma to apes and monkeys. No record was made of the occurrence of inclusions in these animals in 39 instances. Of those (35) seeking these

structures, however, inclusions were found by 13 workers all but once in the higher species. In contrast, 22 investigators failed to find inclusion bodies in infected monkeys. In the latter group fall most of the more modern workers. Attempts were made repeatedly in this laboratory to find inclusions in animals infected with trachoma. Inclusion bodies, however, were never found. On a few rare occasions, inclusions were demonstrated in small numbers in experimental inclusion blennorrhea and in experimental swimming-bath conjunctivitis. Despite this failure in trachoma, it is felt that inclusions may occur, as others have reported, in the experimental disease of animals, but in any case their occurrence is too infrequent to supply appropriate conditions of study. It may be that their extremely low incidence in monkeys merely reflects the relative resistance of the animal to the virus, thus preventing its normal rate of multiplication and its more natural development.

Discussion

The material reported upon in the present communication divides itself into three convenient parts for discussion: the occurrence of inclusions in trachoma and clinically related conjunctivitides, the distribution of the inclusion according to various coexistent factors, and the possible significance of the inclusion in the pathogenesis of the disease.

The occurrence of the inclusion in only 1 of 3 patients, as demonstrated in this laboratory and elsewhere, indicates that for general diagnostic purposes, it falls short of the desired end. However, since the older cases of trachoma have usually advanced to a stage where clinical recognition is less complicated, the inclusion body may still be a more valuable guide than the gross figures suggest. In recent trachoma, when the disease is undifferentiated, the incidence of the inclusions is high, so that even up to 6 months following onset the bodies may be found in more than half the patients, thereby amplifying their diagnostic value. The presence of similar transformation of the epithelial cell in swimming-bath conjunctivitis and inclusion blennorrhea need not frequently offer difficulty, since the usual onset in these conditions is acute, sometimes even explosive, in contradistinction to the usually slow, insidious beginning of trachoma, a difference of importance in clinical differentiation.

The presence of the inclusion in conditions other than trachoma, as illustrated, may indicate merely an accident or that the respective infectious agents are biologically related. If it is considered that the inclusions are not only identical, but that the diseases are clinically similar and that the viruses associated with them bear in common all the properties thus far studied, even to inducing in monkeys an identical conjunctivitis,[7] then it would seem more logical to regard the inclusion of trachoma as specific, just as serological types of the same bacterium still retain their species-specificity (for example, pneumococcus, Friedländer's bacillus, and others).

The distribution of inclusions in trachoma does not parallel most coexistent factors. Apparently their frequency varies only with the duration of the disease, attaining high incidence in more recent infection. Despite their subsequent disappearance, the clinical condition may not only remain, but it may even progress to more severe manifestations. On the one hand, this may imply that the early, normal response of the epithelium undergoes an alteration in reactivity to the virus, or, on the other hand, the virus suffers a gradual adaptation to the tissues, which retards its original rate of growth and lessens its irritative capacity.

Unless the statistical evidence reviewed above on infectivity of different trachomatous tissues is fortuitous, it seems that the inclusion body may be a factor in pathogenesis. The striking curve obtained from the experiments in monkeys discloses that tissues with inclusions possess twice the capacity to cause infection than tissues without inclusions, while equal mixtures of both tissues indicate an infective power halfway between those of the two component tissues. The implications arising from this observation seem particularly significant. Assuming for discussion that the inclusion really is a mass of infectious units and that maximal infection is obtained only in their presence, there remains to be explained the induction of infection in their absence. If, however, the inclusion is an agglomeration of viral particles, it is obviously possible that any number of infectious units may exist singly or in small numbers and so distributed that their appearance or recognition becomes, if not improbable, difficult and uncertain. Consequently, it is not unlikely that some of the tissues classified as devoid of inclusions might still have infectious units present in the form of isolated particles, thus maintaining the ability to infect, although at a reduced rate. This, also, must be the explanation for infectious monkey (trachomatous) tissues none of which have ever been found to contain inclusions in this laboratory. If, moreover, the tissues containing inclusions were then to be pooled in approximately equal parts with tissues lacking inclusions, theoretically a reduction in infectivity would be expected to approach midway between the maximal and minimal values of the pooled materials. And so in fact, while the experiments were not planned for this purpose, the results actually indicate this interrelation between inclusion body and infectivity. While it cannot be said that the evidence is conclusive, the data are of sufficient magnitude to suggest strongly that the inclusion may be a mass of virus particles.

Aside from the theoretical considerations of this observation, the practical indication is clear that as a patient loses inclusions, he ceases *pari passu* to be a source for the dissemination of trachoma.

Summary and conclusions

1. Single examinations for inclusion bodies were undertaken in 602 individuals representing different stages of trachoma.

2. Inclusions were found in approximately 1 of 3 patients.

3. In certain instances, inclusions were present in preparations from one eye only, despite clinical activity in both.

4. In genuine monocular trachoma, inclusions were associated with only the affected eye.

5. Of different forms of conjunctivitis studied, only inclusion blennorrhea and swimming-bath conjunctivitis yielded inclusions.

6. Of various concurrent factors analyzed, the incidence of inclusions ran parallel only to the duration of trachoma.

7. More than half the patients with trachoma up to 6 months' duration exhibited inclusions; from then on the incidence fell gradually to zero at about 10 years' duration.

8. In recurrent trachoma, inclusion bodies appeared in approximately the same frequency as in primary trachoma of recent onset.

9. Tissues containing inclusions were found to possess twice the infective capacity for monkeys that tissues deficient in inclusions revealed, while equal mixtures of both attained an infectivity approaching halfway between those of the two component tissues.

10. The data on infectivity suggest that the inclusion may be a mass of infectious units.

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ESSENTIAL PROGRESSIVE ATROPHY OF THE IRIS

Report of a case

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Essential progressive atrophy of the iris is considered a rare disease. Only 32 articles with reference to progressive, spontaneous, or essential atrophy of the iris were found by search of the Index Medicus, Cumulative Index, and Cumulative Index Medicus.

In a study of these 32 reports, it is found that several cases do not fulfill the essential character of this disease; that is, atrophy without recognizable cause. Furthermore, several cases had not been observed prior to the onset of glaucoma, so that it could not be stated that the atrophy of the iris was not the result of glaucoma rather than spontaneous or essential in nature.

To facilitate study of the true characteristics of this disease and, further, to clarify the literature on this subject, the cases reported to date are here divided into three groups. Cases belonging in group 1 include those observed prior to the onset of glaucoma, there being little doubt as to their essential or spontaneous onset. Classified in group 2 are those cases observed after the onset of glaucoma, there being no other probable cause. In group 3 are placed those cases possessing features which do not seem to be compatible with the diagnosis of essential progressive atrophy of the iris.

The following case report is recorded because it has been observed prior to the onset of glaucoma and because it possesses features warranting a diagnosis of essential progressive atrophy of the iris.

Report of a case

A man, aged 32 years, came to The Mayo Clinic on August 2, 1939, for the purpose of having a general physical examination with particular reference to three complaints; namely, an irregular pupil of the left eye, indigestion of two years' duration associated with nervous tension, and discolored semen. The history obtained through detailed questioning concerning each system revealed no further complaints except that of "nervousness."

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With reference to the left eye, the patient disclosed that he had first noticed displacement of the pupil in 1934. In that year, the pupil of the left eye was slightly pulled toward the left temple. The onset was gradual and was unassociated with any pain, tenderness, or inflammation of the eyes. The patient was emphatic in his denial of any injury. Throughout the next two years the pupil became increasingly misplaced until it resembled a horizontal slit extending toward the left. The left eye remained comfortable and the vision was unaffected, the patient being little concerned over the misplaced pupil. In 1937, he observed in the iris of the left eye a small slit which extended toward the nose. This gradually enlarged until the entire iris appeared to be divided into an upper and lower portion, separated by a horizontal pupil. In 1938, there first appeared a small pinhead-sized black spot in the center of the upper half of the iris of the left eye. This has gradually increased in size until the patient now believes a definite hole has formed. The right eye has remained normal.

Examination of the eyes showed the vision in the right eye to be 6/6 and in the left eye 6/6 with correction. With the standard A.M.A. chart the patient read 14/14 with the right eye and 14/21 with the left eye. The lens correction which the patient was wearing at the time of the examination consisted of a +.75 D. cyl. ax. 105° for the right eye, and +1.00 D. sph. ⊂⊃ + .75 D. cyl. ax. 77° for the left eye. On examination by the confrontation method the visual field was found to be normal. The eyeballs were of average shape and size. The ocular excursions were within normal range. The lid margins of both eyes were slightly reddened, and a moderate amount of oily secretion was expressed from the meibomian glands. The cilia were average in number. The palpebral conjunctivae of both eyes were slightly hyperemic. No evidence of discharge was discernible in the fornices. The bulbar conjunctivae were clear. The corneae were equal in size and shape and grossly clear. The anterior chambers were of normal depth. The iris of the right eye

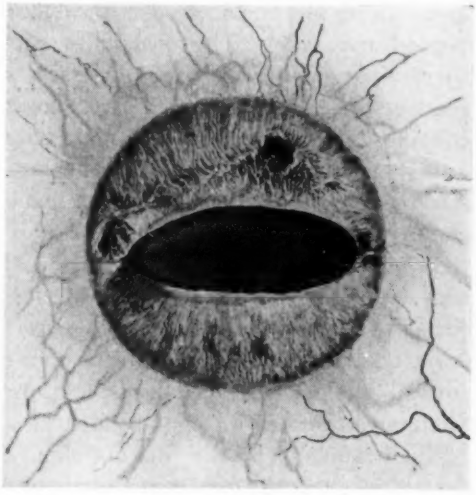

Fig. 1 (Henderson and Benedict). Essential progressive atrophy of the iris.

was light green in color, the pupil round and regular.

In the left eye the iris was light greenish-gray. At the extreme nasal and temporal periphery, roughly corresponding to the nine and three-o'clock meridians, it was pulled toward the limbus by band-like iris tissue. This caused the pupil to appear as a horizontal slit. At its greatest diameter, however, the pupil remained separated from the limbus by 1 mm. of iris tissue. The margin of the pupil was formed by ectropion of the pigment layer of the iris, the largest amount of pigment layer being visible at the three and nine-o'clock meridians. In the midportion of the iris stroma above, roughly corresponding to the one-o'clock meridian, was

an irregularly shaped defect which appeared to extend through the entire thickness of the iris (fig. 1). The pupils of both eyes reacted smartly to direct and consensual light stimuli. The tension of both eyeballs to palpation was well within normal range.

By ophthalmoscopic examination the lens and vitreous of the left eye were found to be clear. The fundus produced a good red reflex. The optic disc was normal in shape and size, possessed a good color, and exhibited a physiologic cupping. The margin of the optic disc was sharp and distinct. The retinal vessels and macular area showed no abnormalities.

The cornea, anterior chamber, iris, and lens were studied with the slitlamp. The cornea was clear throughout, no deposits or defects being observed on the posterior corneal surface. No cells, pigment, or floaters were noted in the anterior chamber. The aqueous humor was not cloudy. At the defect in the upper part of the iris the anterior-stroma layers appeared to have melted away; a few straggly strands of iris stroma extended toward the center of the defect. It was also seen that the splitting and atrophy of the iris extended through the posterior layers, the entire defect having all the characteristics of a true hole. The remainder of the iris, both above and below, possessed a faded color. The strands of iris tissue in the anterior-stroma layer appeared pulled toward the horizontal plane as though they were under the influence of a mechanical stress or strain. At the three and nine-o'clock meridians the iris stroma was piled up around thick bandlike tissue. In these regions the iris tissue had become adherent to the limbus.

A diagnosis was made of bilateral mild meibomitis and essential progressive atrophy of the left iris.

Refraction under cycloplegia showed compound hyperopic astigmatism. A +.25 D. sph. $\bigcirc\!\!\!-$ + 1.00 D. cyl. ax. 95° for the right eye, and a +1.50 D. sph. $\bigcirc\!\!\!-$ +1.25 D. cyl. ax. on the left side were prescribed.

The results of general examination were entirely negative.

To group 1, which includes cases reported by de Schweinitz (1915-16), Barr, Gifford, Jeancon, Kadlický, Kreiker, McKeown, Rochat and Mulder, Waite, Mohr, Arnold, Rieth, and Ellett, this case is added. The reports of Arnold and Rieth concern the same patient, each author reporting observations made at different stages of the disease. Ellett's report deals with the pathologic interpretation of the case observed clinically by de Schweinitz. A summary of the findings in these cases is recorded in table 1.

It is readily seen that this disease occurs predominantly in the female sex, in the ratio of five women to one man. These data are in disagreement with the sex incidence recorded in 1926 by de Schweinitz, who reported the proportion of women to men as seven to five. De Schweinitz, however, included many cases which are here classified in group 3, cases which possess a probable cause.

In these 12 cases the average age at the time of onset of the iris defect is approximately 30 years. This figure corresponds to the statement of several observers that the disease is one of comparatively early adulthood.

All of the defects in group 1 were unilateral, the right eye being affected as frequently as the left eye. Indeed, so frequent is the unilateral nature of the disease in the 27 cases studied that this feature may almost be regarded as one of the certain characteristics of essential progressive atrophy of the iris.

In every case of group 1 except two, variable degrees of hole formation were present in the involved iris, a hole consist-

TABLE 1

A SUMMARY OF THE CASES BELONGING IN GROUP I

	Sex	Age at Time of Onset of Iris Defect years	Eye Involved	Holes Evident in the Iris	Glaucoma Developed	Ectropion of the Uveal Pigment	Duration of the Iris Atrophy before Glaucoma	Color of the Iris
Arnold-Rieth	F	26	Left	Yes	Yes	?	3 yrs.	Blue-gray
De Schweinitz-Ellett	F	20	Left	Yes	Yes	Yes	2 yrs.	Blue-gray
Gifford	F	38–40	Right	Yes	Yes	?	?	?
Jeancon	F	29	Right	Yes	Yes	?	more than 2 yrs.	?
Kadlický	F	20	Right	?	Yes	?	3 yrs.	?
Kreiker	F	less than 41	Left	Yes	Yes	Yes	more more 2 yrs.	?
McKeown	F	29	Left	None	Yes	Yes	4 yrs.	Blue-green
Rochat-Mulder	F	41	Left	Yes	Yes	Yes	1–6 yrs.	?
Waite	F	22	Right	Yes	Yes	Yes	1 yr.	Gray-green
Mohr	M	29	Left	Yes	Yes	Yes	8 yrs.	?
Barr	F	48–49	Right	Yes		Yes	more than 6 yrs.	Blue-green
Case Reported	M	27	Left	Yes		Yes	more than 5 yrs.	Gray-green

ing of complete atrophy of the anterior stroma and posterior pigment layers of the iris, thus allowing transmission of the red fundus reflex.

In eight of these cases ectropion of the posterior pigment layer of the iris was observed. In the four other cases no definite statement was made as to the presence or absence of ectropion uveae. Of those cases in which this abnormality was observed, five, those of Kreiker, McKeown, Waite, and Barr, and this case, exhibited the defect prior to the onset of glaucoma. De Schweinitz and Rochat and Mulder made no comment concerning the onset of the ectropion uveae, but observed this characteristic defect in the enucleated specimens, Ellett recording the findings of de Schweinitz's case. Mohr, although noting this eversion of the iris-pigment layer, likewise made no comment concerning its onset. Since the observations as regards ectropion of the posterior pigment layer of the iris are too incomplete, it is not possible to make a definite statement as to its incidence. However ectropion uveae has been observed sufficiently to warrant its consideration as a frequent accompaniment of essential progressive atrophy of the iris.

These observations are in disagreement with Feingold's statement that "when atrophy of the iris is the result of glaucoma, ectropion of the retinal pigment forms an almost constant part of the clinical and pathologic picture"; Feingold implied by this statement that ectropion uveae is the result of glaucoma rather than an accompaniment of essential atrophy of the iris.

In all of the cases in group 1 except two, Barr's and this case, glaucoma eventually developed. All of the remaining 16 cases reported in the literature were likewise associated with glaucoma. As regards the interval which elapsed from the first appearance of a misplaced pupil until the onset of glaucoma, there exists a wide range. Of the cases in group 1 the shortest interval, slightly less than one year, is found in Waite's case; the longest interval, eight years, is found in Mohr's case. The atrophy of the iris in Barr's case had existed six years, at the time of reporting, without evidence of glaucoma, and the case here reported has gone five years.

From the data recorded, no definite correlation can be made between this disease and the type of pigment coloring of the affected iris.

All patients of group 1 were reported as possessing good general health, no obvious cause for the atrophy of the iris being found in the physical examination. In de Schweinitz's case retrobulbar neuritis of the eye opposite to the one affected with atrophy of the iris developed, but de Schweinitz saw no basis for considering the retrobulbar neuritis as an influencing factor in the progressive atrophy of the iris. No previous history of injury was evident in any of the cases of this group.

It is not the object of this paper to review in detail the various hypotheses regarding the causation of essential atrophy of the iris, as this phase of the subject has been adequately discussed in the excellent reviews of Barr, McKeown, Post, de Schweinitz, and others. However, there are certain features of our case which tend to support the hypothesis first expounded by Rochat and Mulder; namely, that the peripheral synechiae present in this type of atrophy of the iris contribute in some measure to the progress of the disease. McKeown likewise called attention to this observation.

Rochat and Mulder noted the peripheral synechiae to be most developed in the region where the pupil was pulled toward the limbus. In addition they found the tissue of the iris in these regions to be more compact in contrast to the more rarefied character of the remaining iris tissue. This case exhibited both of these features. They further stated that "The principal factor in the process is the soldering together of the root of the iris with the periphery of the cornea beginning at a circumscribed spot and leading to displacement of the pupil. In a second stage, the pulling over of the iris causes distension of the anterior layer of the opposite part, resulting in atrophy, and, finally, tearing of the stroma, alone or together with the pigment layer." In this case the peripheral synechiae certainly seemed to exert some pull on the remaining stroma of the iris, since the individual fibers were tipped toward the horizontal as though they were arranging their axes to parallel the direction of greatest mechanical stress or strain. Waite, in the description of his case, also pointed out that the maximal atrophy of the iris occurred opposite to the uveal ectropion and anterior synechiae, thus suggesting that traction influenced the progression of the atrophy. In like manner de Schweinitz expressed the belief that his case conformed to the observations of Rochat and Mulder.

In the final analysis this case gives no

clue as to why the peripheral synechiae developed, and we must agree with Waite that before the pathogenesis of this disease is elucidated, further study must be made of the physiologic and pathologic characteristics of the mesodermal portion of the iris.

As regards the remainder of the cases reported, they fall roughly into two groups: those not observed prior to the onset of glaucoma, and those which seem to possess some etiologic factor.

In the former group, or group 2, we have included the case reports of Zentmayer, Licskó, Larsson, Klauber, Griscom, Feingold, Lyding, and Post. Griscom's case, in addition, showed no evidence of a misplaced pupil or peripheral synechiae but did show almost complete destruction of the endothelial cells lining the posterior surface of the cornea, the latter factor suggesting some other type of disease. Lyding made no claim that his cases were true essential atrophy, merely suggesting that they resembled this disease in many respects. In the remainder of the cases of this group, no opportunities for accurately determining the intraocular pressure prior to the onset of glaucoma were available. Had it been possible to observe these cases earlier in the course of disease, it is likely that many of them would have been true cases of essential progressive atrophy of the iris. Licskó's case in particular was seen by Pór five years prior to Licskó's observations, Pór making the diagnosis of "genuine atrophy of the iris" but unfortunately making no mention of the intraocular tension.

In group 3 are included the reports of Murray, Wood, Lane, Johnson, Hess, Harms, Franck, Fine and Barkan, and Almeida. The reports of Murray and Wood concern the same case. In Murray and Wood's case a definite anatomic diagnosis of subacute and chronic fibrinoplastic iridocyclitis was made, thus suggesting a definite cause for the atrophy of the iris. As pointed out by Post, de Schweinitz, and Fine and Barkan, the cases of Hess and Harms likewise possessed evidence of iridocyclitis, thus excluding them as true examples of essential atrophy. In Johnson's case a possibility of sympathetic uveitis existed. As pointed out by de Schweinitz and Barr the atrophy of the iris in Lane's case was possibly caused by the latent tuberculosis found on physical examination. The anomalies of the iris in Franck's case, according to de Schweinitz, were probably congenital in origin. The bilateral occurrence, the age (5 years), and the statement of Fine and Barkan that the atrophy of the iris and glaucoma were concurrent, eliminate this case as one of the essential type. Almeida's case likewise was bilateral.

Summary and conclusions

Review of the literature and report of a case of essential progressive atrophy of the iris were made. The literature was studied as regards the qualifications necessary to warrant a diagnosis of essential atrophy of the iris. Eleven cases (or 12, including the case here reported) were found which definitely appear to belong to this group.

This condition was found to be chiefly a disease of young adults, unilateral in occurrence, more prevalent in females, and ultimately associated with glaucoma. The formation of anterior synechiae, ectropion uveae, and holes in the iris is a frequent accompaniment of this disease.

Several features of the case reported suggest a mechanical factor as influencing the progression of the atrophy of the iris. No conclusions were made concerning the cause of essential progressive atrophy of the iris.

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THE AMERICAN BOARD OF OPHTHALMOLOGY*

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Boston

Dr. Sylvester Judd Beach has been studying the origins or sources from which came the American Board of Ophthalmology—what he aptly calls "the turbulent years from 1908 to 1915."† He has covered (no easy task) the periods of conception and gestation thus bringing his story down to about 1914 when the Board was born. Some of you heard him at San Francisco and know what a wonderful job he did digging out the hidden facts and interpreting them, thus revealing their meaning and their profound effects, clothing it all in his fine literary style, so rare a gift among ophthalmologists.

Taking this baby, of whose birth he made such a vivid tale, I propose to sketch some of the tough going the poor kid had, some of the good friends, saying very little about his enemies and showing how he has grown to maturity and now has a dozen babies that he has begotten and how papa and the whole family are thriving.

I shall not attempt any such truly historical and complete account as Dr. Beach has begun; you may expect with confidence that he will go on with his story in due time. In fact, if you expect me to tell you who was president at this time and who secretary at that, and who served on this committee and who on that, I believe your feelings might be expressed by the story of the boy in the country school who could not answer the question who is president of the United States. The teacher, wishing to impress him and perhaps to shame him, told him to ask his father. Next day: "Well, Johnny, did your father tell you who is president?" Johnny, with a triumphant air: "I axed Paw and he didn't know," rhetorical pause—"Paw didn't know who is president, and what's more, he didn't give a damn!"

A committee of the American Ophthalmological Society was appointed in 1913. It was to report on Ophthalmological education. In 1914, it made the recommendation that Class-A medical schools should establish graduate courses in ophthalmology leading to a suitable degree. It was the unanimous opinion that in the near future the number taking it would be small and that it would not solve the problem of differentiating between competent and incompetent ophthalmologists. This baby expired after a few gasps.

But Dr. Jackson was not easily discouraged. He conceived again, and during the nine months that followed much intercourse was carried on by letters to all those interested or able to contribute ideas. A joint committee was formed of three from each national society. When this committee met in 1915, it was at the University Club in Chicago. There were present:

A.O.S.	*A.M.A.*	*Academy*
Standish	Jackson	Todd
Wilder	Ellett	Lancaster
Duane (absent)	Woods (absent)	Reber (absent)

When we took account of stock, we found we had no name, no chairman, no program, no organization nor by-laws, but we had lots of vitality and enthusiasm and ideas. For, as I intimated, Dr. Jack-

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* Read at the dinner celebrating the twenty-fifth Anniversary of the American Board of Ophthalmology, in Chicago, October 8, 1939.

† American Journal of Ophthalmology, 1939, v. 22, no. 4, pp. 367-374.

son had been disseminating, in his effective way, ideas and aims.

A letter to Dr. Jackson from Dr. Duane making detailed suggestions as to organization was made the basis of our discussions. Dr. Duane took a very deep interest in the board. He wrote long and carefully-thought-out letters to Dr. Jackson and to me. Unfortunately his health was too precarious to permit him to attend the meetings in person where his participation in the discussions would have been so valuable. I know of but one meeting of the board which he attended in person during his membership of several years.

Dr. Jackson was made temporary chairman and Dr. Todd, temporary secretary —both later made permanent. Three committees were appointed, A. on organization, B. on requirements or qualifications, and C. on examinations. These committees reported at the next meeting, which was the organization meeting at The Shoreham, in Washington, May 8, 1916.

The name, American Board for Ophthalmic Examinations, was chosen by Dr. Jackson. We now had a program and a goal, namely, a method of certifying the competency of ophthalmologists, but plenty of problems and differences appeared.

The constitution and by-laws were routine.

The difficulties began to arise when requirements for qualification were discussed. Dr. Standish, Dr. Wilder, and Dr. Todd comprised this committee. Who should be invited to take the examination? for by this time it was agreed that we should have examinations. Should we give them a degree, a diploma, a certificate, or a license?

It was agreed that granting degrees was a function of the universities and we should have no part in that. Licenses were a matter for the state, we certainly should have no part in that. Yet there were those who pictured the plan of examinations as leading eventually to licensing and there still are. A certificate was agreed on and the wording decided. Later, Dr. Casey Wood designed the certificate with its ophthalmoscope, fundus oculi, and the serpent of Æsculapius.

The question of whom to invite to our examinations remained undecided.

In the meantime, at the next meeting (1916, in Detroit) nonmembers were invited to help us decide. Dr. Risley, Dr. de Schweinitz and, as the Section was meeting at Detroit, the chairman and secretary of the Section, Dr. Parker and Dr. Derby.

Should certification apply only to future ophthalmologists or include those already in practice? Should any be certified without examination? Dr. Risley thought examination or certification should not apply to practitioners or ophthalmologists already in practice. Dr. de Schweinitz thought it should apply to all, and those whose records were such that there could be no question as to their competency could be certificated on their records.

As you know, it was eventually decided to invite all ophthalmologists to apply for certification. To grant certificates to those whose application blanks and whose records as ophthalmologists showed that they would be recognized by ophthalmologists in general as competent—not simply recognized in their own town, but by attendance and participation in medical meetings and by writings were widely and generally known by common consent as competent ophthalmologists—these should be certified without *further* examination.

I was always strong for the point of view that no one was to be certified without *some* examination. The first step in

the examination was examination of the record; when this was enough why look for further evidence? But this part of the examination has never been omitted and never will be.

Meantime the major preparatory job was the planning of the examination; its scope, content, ground to be covered, method of procedure, organization of the examiners. In appointing the Committee on Examinations, the president, Dr. Jackson, did not choose haphazard with nine men from whom to select. He secured a judicious blending of conservative and progressive, a majority of mature and experienced men and a younger inexperienced but willing member to act as secretary. The members were Dr. Hiram Woods of Baltimore, Dr. Wendell Reber of Philadelphia, and Dr. Walter B. Lancaster of Boston, recently returned to Boston after 10 years' absence on account of ill health.

What subjects should be included?

In view of the importance of this subject, I sent outlines of proposed plans not only to the members of the Board but to many whose experience and reputation entitled then to a share in our deliberations, even though not members of the Board, even in some cases not ophthalmologists. A voluminous correspondence followed and the plans I submitted to the other members of the committee and then to the Board were based on this study.

I find in one of these letters (from Dr. H. D. Arnold, internist, then Dean of Graduate Medical Education at Harvard) a forecast of the present Advisory Board of Medical Specialities uniting all the special branches of medicine under the oversight of the A.M.A.

I remember a letter from Dr. de Schweinitz. He turned down my proposal to include the subject of the history of ophthalmology in the examination with the remark: "That might do very well for a center of culture and learning like Boston but not for the rest of the country."

Another division of the examination which I proposed but was voted down was a practical demonstration of surgical manipulation on animals' eyes. The Board wished to emphasize other parts of ophthalmology more likely to be neglected by specialists and soft-pedal operative surgery.

The plan I submitted after much correspondence and much thought made the examination consist of

Case reports	
Written examinations	
Laboratory examination	both
Clinical examination	practical

How should these be rated as to relative value? Imagine the sheets of paper covered with plans and proposals in trying to achieve a wise and satisfactory, sound and just appraisal of the value of different subdivisions. We have found that this is superfluous. If a man fails in a subject now, he is conditioned. The fact that he is extra good in refraction will not save him from a condition in pathology. This is in harmony with our aim to help candidates and not shut them out.

Many a man has cause to thank the Board for conditioning him in some subject in which his weakness was greater than he realized. He made good his deficiency to the great benefit of his patients and his own satisfaction and self-respect.

Meantime, an unconscious but very important standard had to be developed among the examiners so that different examiners would give approximately the same mark to the same candidates. This meant establishing standards of what is important and what is unimportant. In-

cidentally, some who have helped in examining and even have served on the Board have not been able to acquire this attitude, have not been able to reach this common ground. It is an argument not appreciated by those who have no intimate knowledge of the practical working of the system, an argument for retaining on the Board practically as permanent members those who do achieve this common viewpoint, this ability to appraise on the same basis as their colleagues.

Two examples will show what I mean: (A) Dr. de Schweinitz was invited by me to help in the examination at Philadelphia and was assigned the subject of the relation of the eye to general diseases. Rather a pat choice on my part, I thought. When his marks were turned in they ran: one man 70, two 60, four 50, all the rest 30 or less. Now obviously this is not a fair way to mark. Attempts have been made by students of the theory of examinations to determine how many out of a hundred should pass, how many flunk, and so on. This will work with very large numbers but even with small numbers there should be some consistency. The examiner argues: If a man does not know his subject I must flunk him. I argue that a stream cannot be expected to rise higher than its source. We must give weight to this thought: What has the candidate been taught; is it his fault that he does not know what the examiner thinks is right? If I condition him can he make good his deficiency? Nearly every subject has suffered at one time or another. Even anatomy—some examiner has a hobby or has recently worked on some phase of anatomy and expects the candidate to know. Pathology and optics and visual physiology are examples.

Of course it is and will continue to be necessary for the Board to be a little ahead of the sources of instruction. That is how the Board exerts its constant pressure for higher standards. My plea is not for low standards but for as high as the traffic will bear. Persistently conditioning a reasonable but not inordinate proportion of candidates, just as the football referee does not call every foul play that he detects (which would mean 90 percent of the plays) but only a judicious proportion calculated to keep the game going smoothly and fairly.*

The other examiner (B) was given, at another place, the subject of therapeutics. He gave every candidate 100 percent. No help here!

The first examination by the Board was at Memphis, December 11, 1916. The questions for the written examination were written on the blackboard and the candidates took their bluebooks and pencils and went to work. One of the first to pick up a bluebook and take his seat among the other candidates was Dr. Edward Jackson. We expostulated with him but to no avail. He wrote out the answers and Dr. Hiram Woods and I secured the book and went over the answers. I kept that book for a long time but many movings have resulted in the destruction of many memorabilia connected with the early years of the Board.

What an object lesson is Dr. Jackson's willingness to submit to whatever he required of others! Yet we often meet candidates who think they should be excused from part or all of the examinations.

It was at this time that the question arose as to the Board certificating each other. We certificated Dr. Jackson but decided not to certificate any more members of the Board until their membership on the Board expired, thus avoiding

* Frisell in the Saturday Evening Post, October, 1939.

inevitable criticism of self-certification.

I recall that Dr. de Schweinitz, when I gave him an application blank with the suggestion that he need not fill out that portion calling for a list of writings, replied that he preferred to fill it all out. He would like to see how it looked. So he had his secretary make a full list of his contributions.

When Dr. Wilmer filled out his application, he looked around for some one to whom he could refer, two references being required. He selected for a sponsor for his ethical standing the Chief Justice of the United States Supreme Court. Incidentally the Chief Justice for good measure added that Dr. Wilmer was also a very able ophthalmic practitioner! For a sponsor for his professional standing, Dr. Wilmer could find no better sponsor than the Surgeon General of the United States Army!

The first certificate I believe was made out to Robert Scott Lamb. He and Dr. Jackson and Dr. Minor of Memphis were the first three to be certified on their records.

The first full report made by the secretary was at this time. I quote one paragraph,

> (3) The main idea and intention in the creation of the Board is to raise the standard of ophthalmology. Should we not therefore increase our activities in an effort to secure the establishment of better means of training specialists by whatever means we may decide.

The question arises as to the most most active members at this important stage of the Board. My reaction to this question is well expressed by the second-year divinity student. He had fallen in love and neglected his studies. We find him taking an examination in hagiology. (For the benefit of the ladies and the younger gentlemen, I may explain that hagiology deals with the lives and legends of the saints.) The question is: Name and describe five of the minor prophets. After much pencil biting, he finally brightens up and writes: God forbid that I should discriminate between these pious and holy men.

I must pass over the next 15 years of growth and development. Comparatively few changes were made in the original procedure, which is the best evidence of the care and study spent in preparing plans.

The Board became well established. Criticisms ceased to be heard from those who at first were not in sympathy with our work. Most of the larger special ophthalmic societies, both national and local, made the holding of the certificate of the Board a prerequisite for admission to membership. Many hospitals required the certificate before promotion or appointment on the staff. The members of the Board felt no doubt that the movement was a success. The steady improvement in the knowledge and training of candidates proved that the major aim of the movement—better training of ophthalmologists—was being achieved. The leading eye hospitals were doing far more teaching of residents and turning out a well-trained product.

Still the boldest among us did not realize how the seed we had sown—or rather had been cultivating—was to grow and spread throughout the entire field of medical practice.

One after another the various specialties adopted our plan. At first the rate of increase was slow. In the first 10 years only one—the otolaryngologists—in the next 10 years 8 more and now 12 with some subdivisions which cover fields too limited for an independent board.

It was after four boards had been

established that the Council on Hospitals and Medical Education of the A.M.A. realized that a movement was under way which needed supervision and coördination. As long ago as 1915, Dr. Arnold, in a letter to me, pointed out that there was nothing to prevent any group of specialists from organizing, appointing examining boards, and issuing certificates. If we could always count on as excellent a board of examiners, he says, as have been organized in ophthalmology, the certificates of such boards in the several specialties might make it unnecessary to establish higher control (for example university degrees); but, he adds, boards of this excellence cannot always be obtained.

It was a wise and timely move which led the Council on Hospitals and Medical Education of the A.M.A. to form the Advisory Board of Medical Specialties. It was a further mark of statesmanship to allow the older and experienced boards to determine the policies and standards to be followed.

To be sure there were moments when the theoretical counsels of enthusiastic inexperience seemed to get the upper hand. For a brief period our Board was denied approval by the Council on Hospitals and Medical Education, because our standards were too low. But when we pointed out that facilities did not exist, and could not be created for a good many years to come, that would make it possible for candidates to meet their proposed requirements; that 200 men could not be squeezed into 40 residencies, that less than 20 per year could be accepted by the few institutions with graduate courses on a university basis, impractical though well-meant theory gave way before irresistible common sense and experience.

We have been looking backward at the past. The chief excuse for this is not glorification of those who have made the present a reality but rather is it to make possible wiser action in the future. Progress without change is unthinkable. This means that our present work is only temporary in its form—permanent as a foundation for future building. Our methods of procedure will pass. Our standards will change—are changing. The basic principles will remain. I for one have full confidence in the younger men who are gradually taking over the work. I rejoice to see them unflinchingly calling for higher standards, always keeping ahead and leading the way.

If I may close with a few personal words, it is to show the younger men that if they have the opportunity offered them to work for the Board the reward is far greater than the sacrifice. Think of the men I have associated with on intimate terms of friendship and collaboration during the 25 years of my humble service, the greatest men in American ophthalmology! What conscientious devotion, what earnestness but what unfailing humor, what keenness of criticism but what toleration, what charity, what coöperation, what good fellowship, what inspiration, what stimulus to do my little best if so be I might be found worthy of a place in the list of those who have done their bit for the advancement of ophthalmology.

Ecce quamodo ludus suis servitoribus reddit mercedem.

520 Commonwealth Avenue.

FIELD CHANGES AFTER SATISFACTORY FILTRATION OPERATIONS FOR GLAUCOMA*

JOHN W. BURKE, M.D.
Washington, D.C.

The operative procedures in glaucoma are done primarily to reduce intraocular tension in order to check the damage that this inflicts on the sensitive nerve elements of the ocular portion of the visual apparatus. New operative procedures for the cure of glaucoma are advanced periodically, these being based on physiologic reasoning. The results of these procedures have been attended by such varying degree of success that many operators, dissatisfied with the methods they have been using, are eager to try a new one if its rationale appeals to them. Hence most of the newer operations undergo a fair trial before they are either discarded or accepted as the procedure that promises best results.

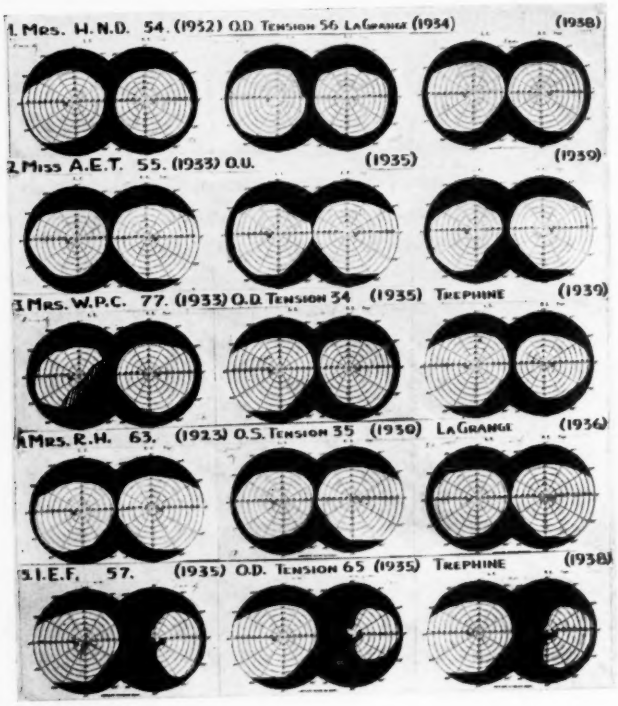
The ocular changes that occur after a well-done operation for glaucoma and that affect vision are numerous, but I will confine myself here to discussing those changes that take place in the visual fields after filtration operations that have satisfactorily functioned for a number of years. I mean by this that the pressure has been kept constantly within the normal range and at a point at which field changes do not usually occur.

This survey is made with the thought in mind as to what reply we can make to our patients when they ask us what effect the operation will have upon the field as time goes on. I am afraid that in the past we have been a bit over optimistic and drew a brighter picture for them than was justifiable; this was probably induced by the fact that we knew that further deterioration would certainly occur if no operative procedure was undertaken. Although many of our patients are elderly, and we feel that we can assure them relatively good vision to the end of their lives, a fairly large number are younger persons who have a much longer expectancy of life. What is to become of these patients?

In an effort to evaluate the changes that take place in the fields after glaucoma operations I have made a survey of the records from my own office files. I have purposely disregarded all clinic cases and selected from my own files those in which I felt reasonably certain that the fields had been accurately taken. Those cases were selected in which there had been an operation for high tension, in which the fields of vision were beginning to fail, or in which they could be expected to fail either because of the high pressure or because of the experience that the patient had had with the fellow-eye.

All cases had these factors in common: (1) some form of filtration operation had been done; (2), the period of observation following operation had been five years or more; and (3) in no case, since operation, had the tension been found to have been above 26 mm. Hg (Schiötz). When I set these three factors as requisites before including a case in this series, I was astonished to find that, in a fairly active surgical practice covering 30 years, only 48 eyes came within its limits. I realize that this number is too small from which to draw definite conclusions, yet I believe that most investigators would find a similar situation were they to make a survey of their own private cases. No attempt will be made to

* Read before the American Ophthalmological Society, seventy-fifth annual meeting, at Hot Springs, Virginia, June 5-7, 1939.



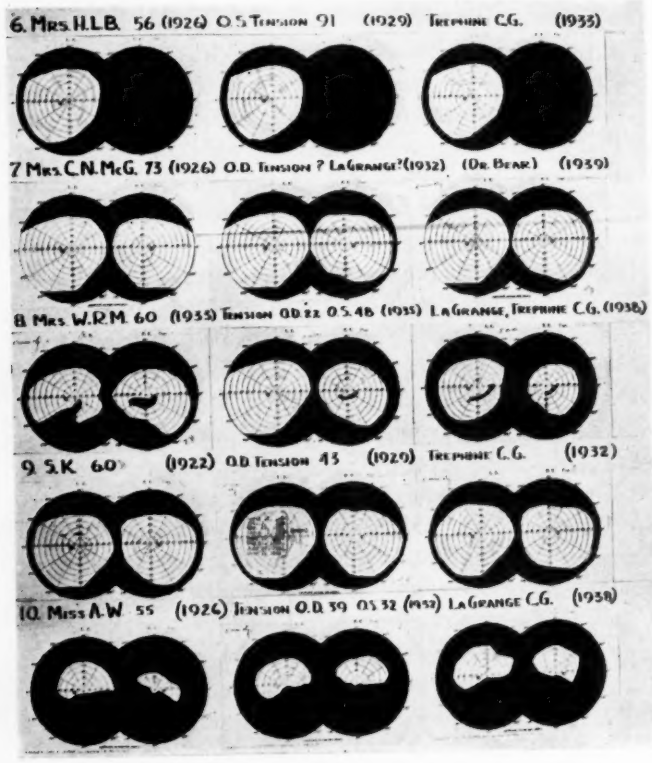


Fig. 1.

Fig. 2.

classify the cases of glaucoma as to type; included in those reported are cases of subacute or chronic glaucoma and glaucoma secondary to changes taking place in the uveal tract. In choosing the type of filtration operation, I have in all cases used either the Lagrange or the Elliot method of trephining: the Lagrange preferably on patients with an anterior chamber deep enough to secure a good scleral flap, and on patients who, we felt, were temperamentally stable enough to continue massage over an indefinite period of time, otherwise the Elliot method was used.

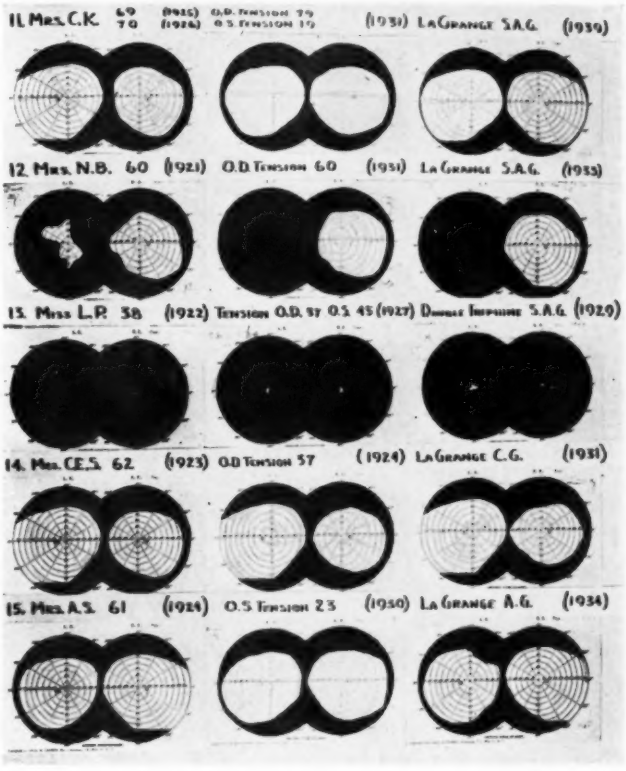
The cases are classified in two groups: (1) those in which field changes have remained stable or unchanged since the operation; and (2) those in which there has been a gradual reduction of the field of vision after operation.

From a survey of the fields shown in cases 20 to 33 it will be seen that in nearly 50 percent of the cases in which the tension has remained within normal limits further field damage still goes on.

The study of this small series of cases does not confirm nor invalidate the many theories that have been advanced as to why the fields of vision are changed in glaucoma. Among these are anemia of retinal elements from early

constriction of certain vessels; atrophy due to stretching of the retinal fibers over the scleral spur; destruction and fibrosis of glial tissue on the nerve head, with its consequent incorporation in the supporting tissue in the lamina cribrosa, and further constriction of the nerve bundles at this point; and intraocular pressure directly on the retinal elements themselves.

Fig. 3.



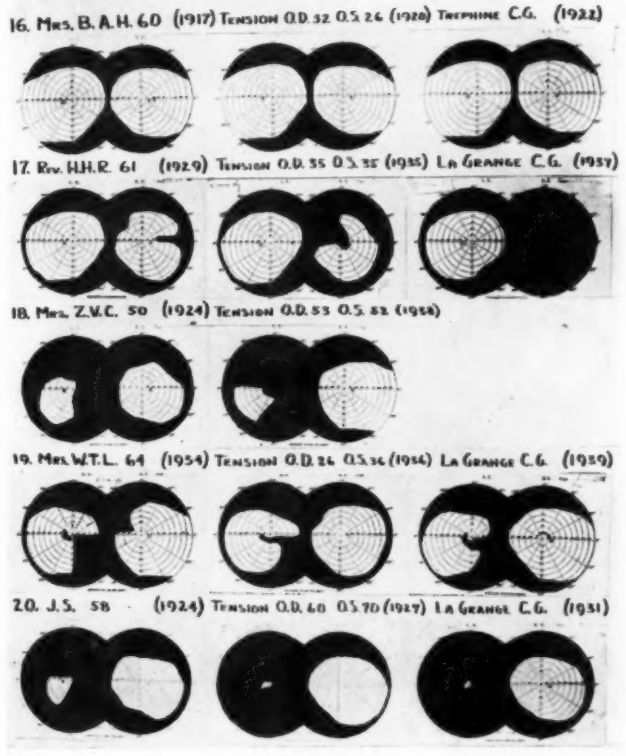


Fig. 4.

The generally accepted theory of the cause of damage to the visual field is that of the stretching of the retinal fibers over the scleral spur as they bend over it, but, according to Traquair, part of the damage is due to direct pressure upon the retina itself. It is presumed that intraocular pressure is exerted equally on every part of the globe, but, since the lamina cribrosa is the weakest part, herniation begins there.

In making a survey of the foregoing cases, the question arises, why do progressive field changes continue in so large a percentage of cases after intraocular tension has been restored to normal limits? One may regard a tension of 22 or 24 mm. Hg as high for a particular person. While this may be true in glaucoma simplex, or in glaucoma occurring in high myopia with low tension, such cases are comparatively rare. In nearly all cases in which the patient's vision

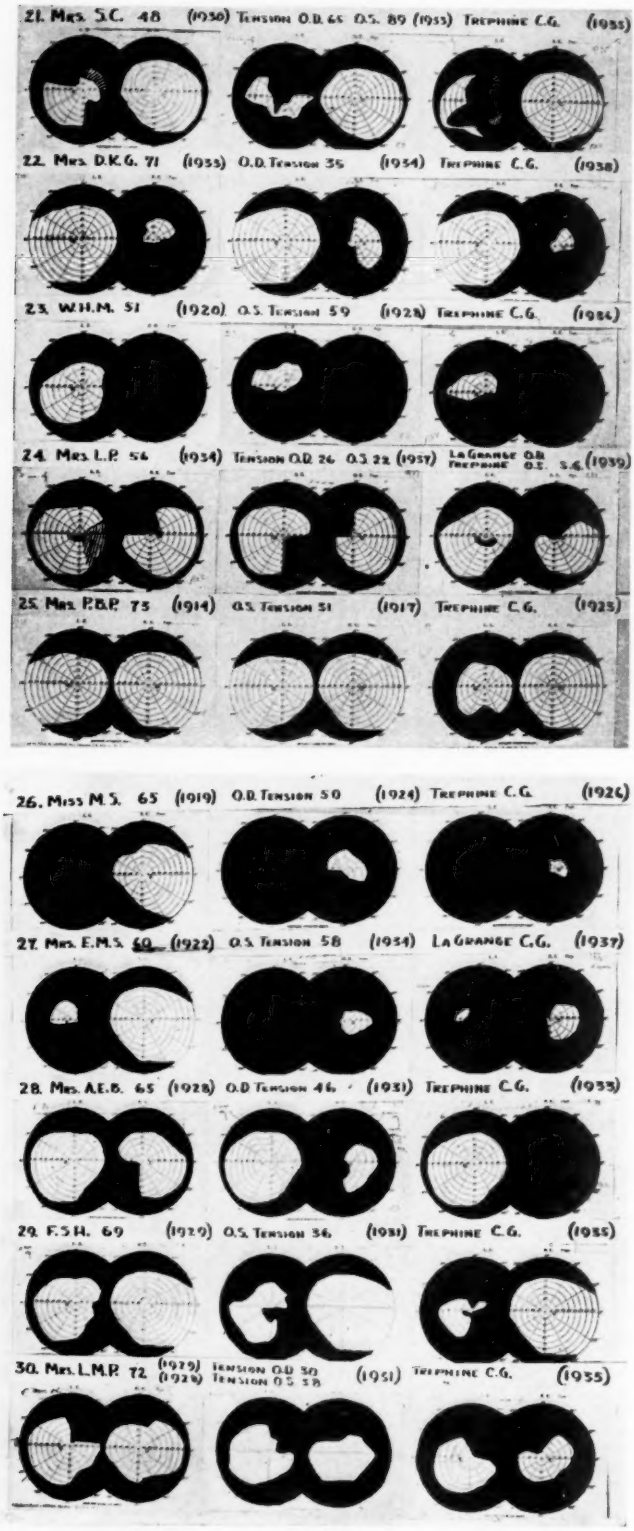


Fig. 5.

Fig. 6.

has become worse since operation, no contraction of the fields occurred until the pressure became elevated above the normal range. Hence some other explanation must be found. Can it be due to a further depression in the disc, once the globe has given way at this point, and the fact that the now normal tension is sufficient to cause further sinking of the cribriform plate, and further stretching of the retinal fibers? Or is there some degenerative process going on that continues independent of the intraocular pressure? I must confess that I am unable to relate in any way the changes that occur in cases that have grown worse, with the changes in the appearance of the disc, because they occur over so long a period of time that I believe it is impossible accurately to measure them. One's inability to detect slight changes in the disc over a period of months or years does not mean that a further deepening of the cup may not have occurred.

There is no relationship between field changes and low tension. A survey of tension after operation shows that it varies between 5 and 26 mm. Hg, with an average, after five years, of $17\frac{18}{26}$ in those cases that have remained stationary, and of $17\frac{9}{22}$ in those cases that have lost field after operation.

Age also does not seem to be a factor. Patients whose fields remained stationary averaged about 59 years, and those whose fields continued to change averaged about 60 years. In none of the cases reported was there a demonstrable detachment of the choroid.

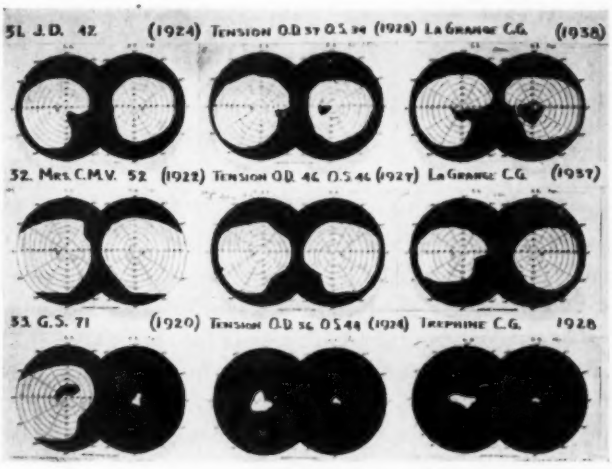


Fig. 7.

Conclusions

From a study of the foregoing fields, I believe the following conclusions may be of value: (1) In filtration glaucoma operations that have been successfully performed we may expect a gradual further loss of the visual field over a long period of years in about 50 percent of the cases. To be sure, this loss does not take place so rapidly as it would if the patients had not been operated upon. Most of these patients will retain central fixation and useful vision in spite of advancing field changes. (2) The type of field defect continues, instead of a new one occurring. (3) We are not justified in hesitating to operate because the fixation area has been invaded—a procedure regarded as dangerous by some surgeons. Although occasionally the process continues, and the point of fixation, or even total vision, is lost, as in case 21, on the other hand, in most instances, as in cases 8, 10, 13, and 33 O.D., the destructive process ceases and useful vision is retained. (4) Early operative interference is the best assurance that no further damage will be inflicted on the visual field. Although this is not always true, as is demonstrated in cases 25, 31, 32, and 33 O.S., yet the fields are best retained in those cases in which little damage has been suffered before operation.

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SULFANILAMIDE AND NEOPRONTOSIL IN THE TREATMENT OF TRACHOMA

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The leading role taken by sulfanilamide in the treatment of some infectious diseases is one of the singular therapeutic successes of the past few years. Although it was originally used in the streptococcal infections of general medicine, numerous successful applications of the drug in the field of ophthalmology have been reported.[1] Gratifying results of treatment of trachoma with sulfanilamide, for example, in gonorrheal ophthalmia, herpetic corneal lesions, abscess of the lids, orbital cellulitis, inclusion blenorrhea, panophthalmitis, and other conditions, have been demonstrated. The first two mentioned lend themselves especially to treatment by this drug.

Attention was drawn to the drug by Findlay[2] and his associates, who were able to protect mice with sulfanilamide against fatal meningo-encephalitis, which normally follows intracerebral inoculations of the virus of lymphogranuloma inguinale. They also drew attention to the morphologic resemblance between the Rickettsialike bodies of trachoma and similar bodies found in the meninges of the brains of mice infected with virus of lymphogranuloma inguinale. This observation led Kirk, McKelvie and Hussein[3] to suggest that this group of drugs might be of value in the treatment of human trachoma.

The use of sulfanilamide in trachoma was first reported by Heineman[4] in August, 1937. He treated one case of trachoma with "septasine" and two others with sulfanilamide. He stated that the results were so brilliant that they reminded him of the first chemotherapeutic results obtained with arsphenamine and with emetine. Five large series of cases of trachoma treated with sulfanilamide have been reported. Lian[5] reported 30 cases in which the average duration of treatment was 14 days. Clearing of conjunctival inflammation, thickening, and pannus, except for old scarring, resulted, but little effect was exerted on follicles. Loe[6] reported 140 cases treated for an average of 24 days. Subjective improvement, consisting of cessation of lacrimation and loss of photophobia, was reported in 24 hours. Improvement in vision was observed in 72 hours in cases of pannus. Paling of the conjunctiva and of trachomatous patches and flattening of granules and follicles were noted. The conjunctiva resumed the normal velvety texture in two months and the blood vessels of the conjunctiva became visible on the fifth or sixth day. In 30 cases clearing of pannus and improved vision were noted in 8 to 15 days. The granules on the lower lids were the last to disappear. Hirschfelder[7] from experience with a series of 25 cases stated that sulfanilamide effected an arrest of trachoma in about three weeks. Improvement was then said to continue without medication.

For convenience the general evolution of trachoma has been divided by MacCallan[8] into four stages as follows: stage I, the early stage of infiltration, stage II, the period of active inflammation, from the time when trachomatous changes become definitely recognizable until scar tissue begins to appear—this stage may last some years; stage III, the stage of

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scarring; and stage IV, the stage when healing seems to have been effected and no further inflammatory activity is evident. He also described several subdivisions which we shall neglect.

Hirschfelder divided his cases into four groups which closely followed the MacCallan classification of the stages in trachoma. In Hirschfelder's series, the trachoma of groups II and III seemed to benefit most by use of sulfanilamide.

Sulfanilamide apparently undergoes widespread distribution throughout the body and this is no less true for the ocular tissues. Bellows and Chinn[11] reported that sulfanilamide can be detected in all ocular tissues within 15 minutes after its oral administration. The maximal concentration of the drug in ocular tissues is reached about the sixth hour after its oral administration. Kirk, McKelvie, and Hussein reported 25 cases in which

TABLE 1

SUMMARY OF DATA ON 11 CASES OF TRACHOMA TREATED WITH SULFANILAMIDE AND NEOPRONTOSIL

Case	Age (years), Sex	Duration of Symptoms, years	Stage of Trachoma	Drug Used	Time After First Dose of Drug, Subjective Improvement First Noted, hours	Improvement in Visual Acuity	Reaction to Drug	Duration of treatment, days
1	31 M	10	II	Sulfanilamide	24	O.D. 6/10− to 6/6− O.S. C.F.* to 4/60	No	14
2	32 M	10	II	Sulfanilamide	24	O.D. 6/7 to 6/6 O.S. 6/20 to 6/6	No	11
3	23 F	19	III	Sulfanilamide	24	Not recorded	Mild	16
4	45 M	15	II	Sulfanilamide	48	Not recorded	No	19
5	28 F	10	III	Sulfanilamide & neoprontosil	24	O.D. 6/60− to 6/30 O.S. 3/60 to 6/30−	Yes	11
6	47 F	4	II	Neoprontosil & sulfanilamide	24	Not recorded	Yes	9
7	61 M	5	II	Sulfanilamide & neoprontosil	48	O.D. 5/60 to 6/60 O.S. 6/60 to 6/60	Yes	19
8	24 F	2	II	Sulfanilamide & neoprontosil	24	O.D. 6/60 to 6/20 O.S. 6/30 to 6/20	Yes	62
9	57 M	10	II	Sulfanilamide	24	O.D. 6/20 to 6/6− O.S. 6/10 to 6/6−	Mild	20
10	51 F	15	II	Sulfanilamide	48	None	No	12
11	58 F	10	II	Neoprontosil	24	Not recorded	No	8

* C.F. means "counting fingers at 2 feet."

Brav[9] reported success in treatment of one case of recurrent ulcerations of the cornea in trachoma by instillation of 2.5 percent of neoprontosil locally. Gradle[10] reported 41 cases, in five of which he was forced to discontinue administration of the drug within a few days because of systemic symptons. In his series erythrocytes decreased moderately in isolated cases and a fairly uniform decrease of leukocytes of from 1,000 to 3,000 below the normal occurred.

marked beneficial results, especially of the corneal complications, were obtained.

Richards, Forster, and Thygeson[12] reported the cases of 12 children having trachoma who were treated with sulfanilamide. Two other children who had trachoma were used for controls. Striking improvements were noted in all 12 cases. The disappearance of the trachoma virus from the conjunctivas of the children treated with sulfanilamide was indicated by repeated failure to demonstrate

inclusion bodies during the period of treatment and by failure of pooled epithelial scrapings taken the twenty-ninth day to infect baboons. The two controls, on the other hand, showed inclusion bodies when tested at weekly intervals.

In this paper we are reporting 11 cases of trachoma which have been encountered at the clinic during the past year and a half and which have been treated successfully with sulfanilamide or its allied drugs (table 1). All of our cases of trachoma were grouped as stage II or III, according to the MacCallan classification.

Although sulfanilamide is a therapeutic agent of great value, it has toxic effects of varying importance. Among the most serious are those associated with the hemopoietic system; namely, hemolytic anemia and agranulocytosis. The development of morbilliform rashes and fever is less serious. Mild toxic effects are common and they include cyanosis, dyspnea, vertigo, nausea, headache, excitement, and confusion. Certain of these reactions appear to be direct toxic effects of the drug whereas others, such as hemolytic anemia and agranulocytosis, are regarded as idiosyncrasies.

Neoprontosil (oral) because of its low toxicity lends itself well to the treatment of chronic conditions in which prolonged therapy is necessary. It usually is tolerated well and seems to have an independent action aside from that of the sulfanilamide which is liberated from it. It also is tolerated in some cases in which intolerance for sulfanilamide has been found. For this reason we have used this drug in the treatment of certain cases of trachoma.

In treating a chronic disease which has a tendency to recurrence, it is necessary to continue administration of the sulfamido drugs for some time after recovery may seem to be complete. The question exists, whether it is best to give small doses for three or four weeks or to give moderate doses for two or three weeks with intervals of rest for from 8 to 14 days. This latter procedure in many respects has seemed the best at this time, since certain organisms may become drug fast and toxic manifestations seem more likely, with prolonged use.

Patients whom we have treated have been under our observation for only brief periods, largely because treatment at home is more convenient for most of them. For this reason our patients appear to have been on treatment for a shorter time than is necessary for complete therapy.

Report of cases

Case 1. A man, aged 31 years, came to The Mayo Clinic for treatment of bilateral trachoma, stage II. Symptoms had begun 10 years prior to admission, and attacks had occurred intermittently since the onset. Over the cornea of the right eye there was a pannus, measuring 2 to 3 mm. in diameter, at the 11:00- to 1:00-o'clock position; there were also many punctate staining areas on the cornea, papillary hypertrophy of both upper and lower lids, photophobia, and lacrimation. In the left eye the pannus completely encircled the limbus, and many old corneal scars were present. Vision before treatment was 6/10— in the right eye and the ability to count fingers at 2 feet (61 cm.) in the left eye.

Treatment with 75 grains (5 gm.) of sulfanilamide a day in five divided doses was begun December 7, 1938. Twenty-four hours later photophobia and lacrimation disappeared and the patient felt better. On December 12th, the eyes were white. After eight days the dose was decreased to 40 grains (2.6 gm.) for six days, and then a rest of 10 days was given. On December 19th, vision in the right eye was 6/6— and in the left eye 4/60. The cornea of both eyes did not

stain, and the pannus was markedly decreased. The patient seemed very comfortable. The patient went home but was advised to continue therapy with sulfanilamide in 10 days. At the beginning of treatment the leukocyte count was 10,100 per cubic millimeter of blood, and the erythrocyte count was 5,000,000. At the end of the treatment leukocytes numbered 12,000 and erythrocytes 5,000,000.

Case 2. A man, aged 32 years, came to the clinic for treatment of bilateral trachoma, stage II. The first attack had occurred 10 years previously. The upper margins of each cornea were scarred from old corneal ulcers and there was a pannus, measuring 3 to 4 mm. in diameter, from the 10:00- to the 3:00-o'clock position in each eye. The conjunctivas were granular. On admission vision in the right eye was 6/7 and in the left eye 6/20 with correction. Administration of 50 grains (3.3 gm.) of sulfanilamide per day was begun on December 19, 1938. In 24 hours the patient felt better, and in 48 hours the eyes had improved objectively. On December 29th, the vision in both eyes was 6/6 with correction, and the eyes were much improved. The pannus had almost disappeared from both eyes, and the granulations on the conjunctiva were smoothed out. The patient was to continue to take sulfanilamide at home. At the beginning of treatment leukocytes numbered 6,100 and at the end 7,000 per cubic millimeter.

Case 3. A woman, aged 23 years, came to the Mayo Clinic for treatment of bilateral trachoma, stage III. Her first attack had been at the age of four years. Grattage was done when she was seven years old. The right upper eyelid was thickened and there was complete symblepharon of the right lower lid. The cornea of the right eye was cloudy and covered with a pannus. In the left eye the conjunctiva was covered with a bluish-gray film, and the cornea was hazy with a superficial pannus in the upper temporal and lower nasal portions of the limbus.

Administration of 40 grains (2.65 gm.) of sulfanilamide and 60 grains (4 gm.) of sodium bicarbonate per day was started on June 22, 1939. In 24 hours the eyes were subjectively better. On June 28th, use of the drug was stopped when the number of leukocytes dropped from 7,700 to 4,600 per cubic millimeter of blood and the number of erythroycytes from 4,440,000 to 4,010,000. On July 18th, a dose of 50 grains (3.3 gm.) of sulfanilamide per day was started. On July 27th, the eyes were reported to be much better. The blood count was then stationary. When treatment ended the leukocytes numbered 7,200 and the erythrocytes 4,290,000.

Case 4. A man, aged 45 years, came to The Mayo Clinic for treatment of bilateral trachoma, stage II. His first attack had occurred 15 years previously. There was scarring and hypertrophy of both upper lids. Several ulcers were present on the left cornea, and a marked pannus. He had been treated previously with silver nitrate, electric cautery, phenol, and zinc. There was considerable photophobia and lacrimation. Vision in the right eye was 6/7 −1 and in the left eye 3/60.

Administration of 60 grains (4 gm.) of sulfanilamide per day was started January 3, 1939. In 48 hours the photophobia and lacrimation had largely disappeared. Eleven days later there was definite objective improvement. Sixteen days after the treatment was begun, the eyes were considered to be in excellent condition. By February 22d, the upper and lower lids appeared smooth and glossy. The pannus on the cornea of the left eye was almost completely quiescent. At the beginning of treatment the leukocytes numbered 5,200 and at the end of treatment 8,400

per cubic millimeter of blood. At the beginning of treatment erythrocytes numbered 4,110,000 and at the end 4,450,000.

Case 5. A woman, aged 28 years, came to The Mayo Clinic for treatment of bilateral trachoma, stage III. The first attack had occurred 10 years previously. The eyes showed marked conjunctival thickening and scarring. The tarsal plates had been removed and there was a pannus on both corneas, marked photophobia, and lacrimation. The patient stated that she was incapacitated two thirds of the time. Vision was 6/60− in the right eye and 3/60 in the left.

Treatment with 75 grains (5 gm.) of sulfanilamide per day was started on July 22, 1939. In 24 hours the photophobia and lacrimation were lessened. On July 31st, the patient had a reaction to the drug. Nausea, fever, chills, and elevation of temperature to 101°F. occurred. The patient was so pleased with the improvement in her eyes that she wished to continue treatment despite the reaction. Treatment with sulfanilamide was stopped on July 31st. It was begun again with doses of 5 grains (0.3 gm.) twice a day, but had to be stopped two days later because the number of erythrocytes decreased from 5,230,000 to 4,130,000. The patient was sent home and advised to continue treatment with neoprontosil under the direction of her physician in her home locality. On August 15th, the vision in the right eye was 6/30 and in the left 6/30−.

Case 6. A woman, aged 47 years, came to The Mayo Clinic for treatment of bilateral trachoma, stage II. She stated that her first attack had occurred four years previously. She had had numerous flare-ups since then. There was considerable palpebral and bulbar conjunctival injection. The tarsal plates were thickened. There was a pannus over both corneas; that in the left was greater than that in the right. Vision in the right eye was 6/15 −1 and in the left eye 6/12 with correction. A daily dose of 75 grains (5 gm.) of neoprontosil was started on March 14, 1939. In 24 hours there was subjective improvement. Diarrhea developed on March 16th from the neoprontosil, and 50 grains (3.3 gm.) of sulfanilamide per day was given instead. On March 21st, because nausea and malaise developed, the dose of sulfanilamide was decreased to 30 grains (2 gm.) per day. The patient had mild discomfort while taking 30 grains (2 gm.) of sulfanilamide, but administration of the drug was continued. On March 23d, there was marked improvement in the ocular condition. The infection was nearly gone. The conjunctiva was smoother and more glossy and the pannus was thinning out. At the beginning of the treatment leukocytes numbered 5,100 and erythrocytes 4,560,000 per cubic millimeter of blood. At the end of treatment the leukocyte count was 5,800 and the erythrocyte count 4,940,000.

Case 7. A man, aged 61 years, came to The Mayo Clinic for treatment of bilateral trachoma, stage II. His first attack had occurred four to five years previously and he had had many recurrent attacks, accompanied by formation of corneal ulcers. The lids showed moderate thickening, and the conjunctiva was markedly scarred. The tarsal plates in both eyes were bowed. There was considerable corneal scarring and a pannus over both corneas; the one over the left cornea was greater than the one over the right. Photophobia was present. Vision in the right eye was 5/60 and in the left 6/60. Treatment with 60 grains (4 gm.) of sulfanilamide and 40 grains (2.65 gm.) of sodium bicarbonate was begun May 9, 1939. On May 11th, the photophobia had disappeared, and on May 17th, the eyes appeared practically white. The cornea was glossy and the pannus was disap-

pearing from both eyes. On May 26th, administration of 60 grains (4 gm.) of neoprontosil per day was begun. Vision was 6/60 in each eye; there were no active granulations; the pannus was thinned and the eyes appeared free from inflammation. The last dose of sulfanilamide caused nausea and vomiting. The eyes were much improved in 19 days. Leukocytes numbered 6,500 per cubic millimeter of blood at the beginning of treatment and 9,500 at the end of treatment. Erythrocytes numbered 5,330,000 at the beginning of treatment and 4,910,000 at the end.

Case 8. A woman, aged 24 years, came to the clinic on account of bilateral trachoma, stage II. Her first attack had occurred two years prior to her admission. The right eye had lost vision progressively. Examination of the right eye revealed the conjunctiva to be red and hypertrophied, and a severe pannus covered the upper two thirds of the cornea. In the left eye there was an old pannus and the conjunctiva was thickened. Photophobia was present. Vision in the right eye was 6/60 and in the left 6/30 with correction. Administration of 60 grains (4 gm.) of sulfanilamide and 40 grains (2.65 gm.) of sodium bicarbonate per day was started on July 19, 1938. In 24 hours most of the photophobia had disappeared. By July 28th, the eyes were improved objectively. The vision had improved, and the lids were more flexible. On August 12th the patient had a toxic reaction which affected the blood cells. A moderate toxic change in the neutrophils was observed and the dose of sulfanilamide was stopped. On September 20th, a dose of 45 grains (3 gm.) of neoprontosil per day was begun. On September 26th, administration of neoprontosil was stopped for one month. On October 18th, the eyes were white and the corneas smooth and glossy. On October 26th, administration of 50 grains (3.3 gm.) of neoprontosil per day was begun and continued for 17 days. On November 12th, both eyes were free from granulation tissue and there had been splendid improvement. On December 12th, the vision was 6/20 in each eye with correction. The patient was instructed to continue to take neoprontosil another month and to return in six months. The leukocytes numbered 8,800 per cubic millimeter of blood at the beginning of the treatment and 7,700 at the end.

Case 9. A man aged 57 years, came to the clinic on account of bilateral trachoma, stage II. The first attack had occurred 10 years prior to admission to the clinic and there had been numerous flare-ups of corneal ulcers and iritis. On examination there was swelling of the right upper eyelid, an eczematoid rash on the skin, and a pannus over the cornea of the right eye between the 11:00- and the 1:00-o'clock positions. Vision in the right eye was 6/20 and in the left eye 6/10 with correction. Administration of 40 grains (2.65 gm.) of sulfanilamide and 40 grains (2.65 gm.) of sodium bicarbonate per day was begun on April 18, 1939. In 24 hours the patient noted marked improvement in his eyes, but complained of headache, anorexia, and malaise. Use of the drug was stopped on April 21st. On June 12th, the patient had slight photophobia and secretion and, therefore, administration of sulfanilamide was started cautiously. He received a total of 16 doses. On July 12th, he stated that his eyes were much improved. His vision was 6/6− in each eye with correction. Leukocytes at the beginning of treatment numbered 5,000 per cubic millimeter of blood and at the end 7,600. Erythrocytes numbered 5,020,000 at the beginning of treatment and 4,750,000 at the end.

Case 10. A woman, aged 51 years, came to the clinic because of bilateral trachoma,

stage II. Her first attack had occurred 15 years previously and she had been troubled since that time with recurrent corneal ulcers in the left eye. There was atrophic scarring of both upper eyelids. In the left eye there was moderate injection of the conjunctiva and a hazy cornea and a pannus from the 10:00- to the 2:00-o'clock positions. The left cornea stained grossly at the latter position, 3 mm. from the limbus. There was an old corneal scar at the 6:00-o'clock position. Vision in the right eye was 6/60 and in the left 6/15 without correction.

A dose of 50 grains (3.3 gm.) of sulfanilamide per day was started on December 3, 1938, and in 48 hours the eyes were reported to be much better. On December 6th, the corneas did not stain, and on December 8th, the eyes looked 50 to 75 percent better. On December 14th, use of the drug was discontinued, but it was to be continued at home. The eyes were no longer inflamed. Vision in the right eye was 6/60 and in the left 6/15. The number of leukocytes per cubic millimeter of blood at the beginning of treatment was 8,200 and at the end 6,000. Erythrocytes numbered 4,450,000 at the beginning of treatment and 4,800,000 at the end.

Case 11. A woman, aged 58 years, came to the clinic because of bilateral trachoma, stage II. Her first attack had occurred 10 years previously. Both tarsal plates had been removed. On the cornea of the right eye was a slight pannus and on that of the left eye a marked pannus with two staining areas. Vision in the right eye was the ability to count fingers at three feet (91.44 cm.) and in the left 6/20 with correction. Administration of 60 grains (4 gm.) of neoprontosil per day in five divided doses was begun on October 10, 1938. In 24 hours the eyes were much more comfortable. On October 18th, the corneas did not stain. The eyes were much better subjectively and objectively. At the beginning of treatment leukocytes numbered 4,900 per cubic millimeter of blood and erythrocytes 4,860,000; at the end of treatment leukocytes numbered 6,400 and the erythrocytes 5,260,000.

Comment

Six of our 11 patients were treated with sulfanilamide only. In three other cases, although treatment was started with sulfanilamide, it was decided to change to neoprontosil because of the toxic effects of the former drug; namely, headache, nausea, and vomiting. Neoprontosil was used exclusively in one case. In two cases in which sulfanilamide was given, evidence of an impending blood dyscrasia appeared, and use of the drug was discontinued. In one of these cases there was a frank toxic change in the neutrophils. In the other case the blood cells decreased temporarily, but a normal count was obtained three weeks after cessation of treatment with the drug. The only complication encountered by us in the use of neoprontosil was diarrhea in one case. We feel that this probably was due to the accumulative effect of the drug in the intestinal tract.

Although the results of treatment with neoprontosil are not nearly so dramatic nor rapid, we feel that on prolonged treatment with this drug in trachoma the results will compare favorably with those following the administration of sulfanilamide.

In all, 288 cases of trachoma including our 11 cases have been reported in which sulfanilamide and in some cases sulfanilamide and neoprontosil have been used. The results have been uniformly excellent. Trachoma probably falls into the group of diseases in which low or moderately low concentrations of sulfanila-

mide in the blood (3 to 5 mg. per 100 c.c.) are sufficient to give satisfactory results when maintained for about three weeks.

Summary and Conclusions

Eleven cases of trachoma treated by sulfanilamide or allied compounds have been reported. In each case marked objective and subjective improvement occurred. Four of the 11 patients were found to be intolerant to sulfanilamide. In three of these cases treatment with neoprontosil was substituted for sulfanilamide, with apparent continuation of the good results.

Trachoma in stages II and III seems to make the best response to treatment. Trachoma probably falls into the group of diseases in which low or moderately low concentrations of sulfanilamide in the blood (3 to 5 mg. per 100 c.c.) are sufficient to give satisfactory results when maintained for about three weeks. Neoprontosil (oral), because of its low toxicity, lends itself well to the treatment of trachoma when rather prolonged therapy is necessary. It appears to be tolerated in some cases in which an intolerance for sulfanilamide has been found. Although the results of treatment with neoprontosil are not nearly so dramatic, we feel that on prolonged treatment with this drug in trachoma the results will compare favorably with those of sulfanilamide although sulfanilamide appears to be the preferable drug. Our results agree completely with the earlier reports on the use of sulfanilamide in the treatment of trachoma.

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EDWARD DELAFIELD: A SKETCH*

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During the period of 75 years since the founding of the American Ophthalmological Society there have been but 45 occupants of the presidential chair. That so few have filled this office is due to the fact that the tenure of office of the first nine presidents lasted from two to five years instead of one year, as is now the custom.

Fig. 1. Delafield coat of arms.

At its organization, the society elected as its first president a venerable leader—Edward Delafield. He had fullness of years, weight of character, and wide experience. He could look back with satisfaction on a long and fortunate career of professional service. It is fitting that on this occasion, one of great historic interest, the society should decide to pause in its established routine to hear the story, gleaned from long unopened and forgotten papers, of the man who stamped its birth with the luster of his name.

The influence of heredity and of association with learned and talented persons is well illustrated in the life of Edward Delafield. In an unbroken line his lineage could be traced through gallant knights and fine courtiers to the time of the Norman Conquest. The motto on the heraldic arms used by his family for centuries runs thus: Insignia fortuna paria—The rewards of effort are equal to good fortune.

The founder of the family in America was John Delafield, who sailed from London on the British letter of marque ship "Vigilant," arriving in New York April 5, 1783. He brought with him the first news of the treaty of peace that marked the end of the long and painful chain of events leading to American independence and also an official copy of the treaty. He found the British flag still flying over the city and over a great fleet in the harbor, and so it was to be until some months later, when Lord Howe could gather up the last of the loyalists and ship them to Canada. New York was already over 100 years old, and most of the patrician families were of Dutch or Huguenot descent. Within a few years John Delafield became rich and prominent. His summer home, "Sunswick House," at Hallett's Point, Long Island, with its famous gardens, was regarded as one of the most spacious and elegant seats near New York.

Edward Delafield, born May 7, 1794, was one of 14 children (seven boys and seven girls) born to John and Ann Hallet Delafield. Through his mother there flowed hot in his veins the blood of revolutionary patriots.

* Read at the banquet commemorating the seventy-fifth anniversary of the American Ophthalmological Society at its annual meeting, Hot Springs, Virginia, June 6, 1939.

He was prepared for Yale at Union Hall Academy, at Jamaica, Long Island, under the tutelage of Mr. L. E. A. Eigenbrodt, a German scholar of distinguished ability, a graduate of the University of Giessen in 1793. Having made satisfactory progress in French, mathematics, and classic studies, he matriculated at Yale, and was graduated Bachelor of Arts in the class of 1812.

Determining on a career of medicine, he was articled to Dr. Samuel Borrowe, a practitioner of great fame in New York, and at the same time he diligently pursued the prescribed course at the College of Physicians and Surgeons. The War of 1812 interrupted his studies, but presumably enlarged his practical knowledge. While the British were blockading the harbor of New York in 1814, a rumor arose that the city would soon be attacked by a powerful expedition of land and sea forces. Commodore Stephen Decatur was given charge of the defenses of the city. Responding to a public plea for aid, young Delafield volunteered as a private in a corps known as "The Iron Grays." Among the last survivors were Edward Delafield and Fitz-Greene Halleck, whose couplet to the memory of Joseph Rodman Drake, "None knew thee but to love thee, nor named thee but to praise," has brought comfort to the hearts of thousands in recalling some dear departed friend. The records of the War Department show that toward the end of the war Delafield served as surgeon's mate and afterward as surgeon in Major James T. Leonard's Battalion of "Sea Fencibles," New York Militia, until March 1, 1815. Peace had been signed in Paris on Christmas Day, 1814, but the news did not reach these shores until February 4, 1815. The rejoicing in the city was unbounded, for not only had its commerce suffered in this second war with England, but prior to this Napoleon's decrees of Berlin and Milan and Jefferson's Embargo Act had caused its ships to be held in port and to rot at the wharves. On the basis of his war record the first president of this society was granted 160 acres of bounty land in 1855 and a pension in 1872.

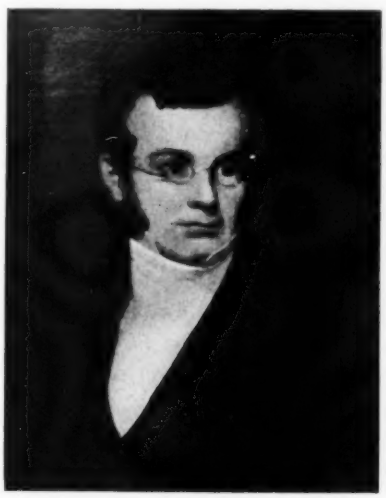

Fig. 2. Edward Delafield in youth.

After receiving the degree of Doctor of Medicine from the College of Physicians and Surgeons of New York he served the customary year at New York Hospital as house physician. In the summer of 1816 he sailed for London to complete his studies abroad. Among his classmates at the College of Physicians and Surgeons was John Kearny Rodgers, whose surgical achievements in years to come were destined to be the pride and boast of the surgical arena of New York Hospital, and of whom Delafield wrote: "Living and laboring together in a common cause, a friendship begun in student days, under the same masters, was cemented in a bond which death alone dissolved." Rodgers preceded him to London, where again they lived and studied together. They were pupils of Haighton, Cline, Astley Cooper, Abernethy, Lawrence, and Travers, whose names recall the

glory of the great medical schools of St. Thomas's, Guy's, and St. Bartholomew's hospitals during the first quarter of the nineteenth century. Under the guidance of so illustrious a coterie, each name eloquent in its own right, it was small wonder that London had superseded Paris as the surgical center of the world. The notes that Delafield made, chiefly from the lectures of Abernethy and Cooper, are preserved among the treasures of the New York Academy of Medicine, and are contained in five quarto volumes, covering 3,313 closely written pages, all accurately indexed. The penmanship is exquisite and the pages are replete with nuggets of knowledge.

During Delafield and Rodgers' sojourn in London life was probably not so gay as it had been a few years before. The Prince Regent, acting for King George III, had grown older and wiser, and Beau Brummell had fled to Paris to escape a debtor's prison in England. It was some time later that Astley Cooper removed the famous wen from the scalp of King William IV, who, as the Duke of Clarence, visited Admiral Digby in New York during the Revolution, and who would have lost his life by drowning in the city's fresh water pond had not the father of Fitz-Greene Halleck rescued him.

While "walking" the wards at Guy's and St. Thomas's hospitals Delafield and Rodgers were advised to matriculate in the recently established London Infirmary for Curing Diseases of the Eye (since renowned as the Royal London Ophthalmic Hospital). This charity had been founded by young Cunningham Saunders, out of sympathy, it was said, for the soldiers seen on the streets of London who were blinded by wounds or by trachoma contracted in the expedition against Napoleon in Egypt. It was at this infirmary that these two young physicians learned that, although they had received the best medical training their own country could give, they had been taught practically nothing about diseases of the eye.

The story of how they then resolved to found a similar institution, "for the first time in America," for the exclusive treatment of diseases of the eye, has become legendary. They could exclaim with the Ancient Mariner,

> "We were the first that ever burst
> Into that silent sea."

Shortly after their return home, on their own responsibility and at their own expense, they leased two rooms in an upper story of a small brick building at 45 Chatham Street, New York, and publicly announced that there the poor could obtain treatment for diseases of the eye and receive medicine gratuitously. Those walls, given now to baser purposes, still stand under the great steel beams of the approach to the Brooklyn Bridge. There two men, not many years after attaining their majority, labored for their fellow man in a way then novel in this country. As has been said by another writer, "wherever man has wrought for his fellow man that is hallowed soil."

This small beginning, undertaken by two youthful workers, may be considered the most important episode in the history of American ophthalmology. It was made in the year 1820, when James Monroe was President, during the "era of good feeling," and only six months after George III, insane and blind, had ended his reign. This undertaking led directly to the foundation of the New York Eye and Ear Infirmary, and within a short time to that of the Massachusetts Eye and Ear Infirmary and of the Wills Eye Hospital.

Soon after the founding of the infirmary, Delafield became a partner of his old preceptor, Samuel Borrowe. Borrowe and Wright Post were the first con-

sultant surgeons of the infirmary, and these two men, who had guided Delafield in his student days, were held by him in the highest esteem and gratitude for the remainder of his life. A large and lucrative practice soon flowed into his office. Few men have attained eminence so rapidly. In 1826, at the early age of 32 years, he was appointed Professor of Obstetrics and Diseases of Women and Children at the College of Physicians and Surgeons. He had a great reverence for womanhood and for maternity and, as portions of his lectures testify, he strove to inculcate this reverence in his students. In 1834 he was appointed attending physician to New York Hospital. By 1838 his large and increasing private practice obliged him to withdraw from both positions, but he continued his labors at the eye infirmary until his death.

In 1842 he carried out a project that he had long contemplated, namely, the founding of the New York Society for the Relief of Widows and Orphans of

Fig. 3. Samuel Borrowe, M.D.

Medical Men. This society was organized at a special gathering of physicians at Delafield's residence. It is unique in its functions, in the manner of conserving its funds, and in distributing its benefits at an amazingly low cost of administration.

There is an interesting connection between the Society for the Relief of Widows and Orphans of Medical Men and the New York Academy of Medicine. In

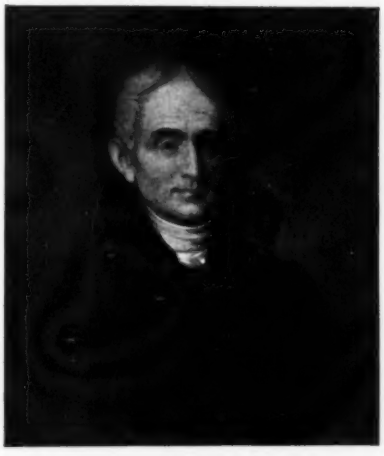

Fig. 4. Wright Post, M.D.

1846, on the occasion of the aforesaid society's annual meeting, the conversation turned to the dissensions and problems of the times. Delafield called attention to the need for an organization that would be devoted to the improvement of medical standards and education and to more effective service to the public. At this meeting, under his leadership, a committee was appointed to formulate plans for an Academy of Medicine. From the very beginning Delafield established the principles to which the academy has always adhered—the avoidance of all political strife. Of how he stood in the politics of his country we have no inkling, but he must have been sensitive to the sectional bitterness and wrangling that are summed up in two famous toasts—"Our Federal Union, it must be preserved," by Jackson, and "Liberty dearer than the Union," by Calhoun.

In 1839 he was elected a trustee of the College of Physicians and Surgeons. He was vice-president from 1855 to 1858

when he was elevated to the presidency, holding this high office until his death 17 years later. He effected the change in the relationship between the college and Columbia University on the basis on which it exists today. He took a most active part in organizing the alumni association of the College of Physicians and Surgeons, and from his private resources he established the present prize fund of the association. On January 23, 1856, in the absence of the president, he presided at the opening of the new college building

Fig. 5. The New York Eye and Ear Infirmary in 1865.

at the corner of Twenty-third Street and Fourth Avenue. He began his address by giving a history of the college and biographical sketches of its late president, Wright Post, and of David Hosack, a contemporary and rival of Post's who is reputed to have been the most celebrated physician of his time in America.

The year 1856 marked the fulfillment of a dream that Delafield had entertained for 36 years, namely, the dedication of the new building for the New York Eye Infirmary, at the corner of Thirteenth Street and Second Avenue. At the opening exercises he delivered an address that gave a complete and intimate history of the institution. The building, the finest of its sort at the time, was believed to be so perfectly conceived and strongly constructed that it would last for generations, and yet in a little over two score years it had been replaced by the present structure. It was in this building that the American Ophthalmological Society held its first meeting in 1864.

As president of the College of Physicians and Surgeons Edward Delafield became a member of the Board of Governors of Roosevelt Hospital. He was elected its first president, and he laid its foundation stone in 1869, in the presence of the President of the United States and a most distinguished gathering. As chairman of the building committee he supervised every detail of its construction, in which were incorporated many of his own ideas. When at last the great building was completed, he presided at its opening exercises. This magnificent hospital was the gift of James H. Roosevelt. The world had not known such munificence for the relief of human suffering since the foundation of Guy's Hospital in London in 1724 by Thomas Guy, and of Wills Eye Hospital in Philadelphia in 1831 by James Wills. All three founders were bachelors. It has been observed that a great hospital, like a great collegiate foundation, frequently originates in the beneficence of a single founder.

At the time of the opening of Roosevelt Hospital Edward Delafield was nearing old age. In the decades that had gone by since, in the first flush of youth, he left New York Hospital, with its lovely lawns and lofty elms on lower Broadway, he had taken part in so many medical projects—one duty fulfilled creating another—that it was said of him that he probably contributed more than any man of

his time to the promotion of intelligent and efficient organization of public ends in the medical profession of New York City. The combination of sound practical judgment and philanthropic conceptions, together with the will power to carry out great enterprises, is rare. It was found in full potency in Edward Delafield.

Notwithstanding the time and energy expended in organizational activities and in a large practice, he never relinquished his interest in or his connection with ophthalmology. He continued to be an active surgeon at the infirmary from 1820 to 1850, when he became consulting surgeon, and in 1871 he was appointed vice-president. On the occasion of the fiftieth anniversary of the infirmary he delivered an address in the institution describing how it came to be founded, "the first of its kind in America." He stood alone, the sole survivor of the founding fathers.

Much of his fame as a practitioner was derived from his successful treatment of diseases of the eye. Delafield was not only a specialist himself, but was a champion of specialists, ever pointing out to the general practitioner the advantage of having some one to consult who has devoted his time and energy to one particular branch of medicine. He reserved the right to treat any diseases of the body that he considered might be affecting the organs of vision. He would say to his students that one may continue his pupilage through life, but that there is much knowledge that, if not obtained in school, will never be acquired later on. In early youth, before the heavy burdens they were destined to bear had been laid on his shoulders, he edited, with copious notes, Benjamin Travers' Synopsis on Diseases of the Eye. This edition, dedicated to Wright Post, was published in New York. Occasionally he contributed an article on ophthalmology to the journals. It is probably of slight consequence today whether he wrote much or not at all, so few of the ophthalmologic writings of his generation have endured. As Longfellow said:

> "Happy those whose written pages
> Perish with their lives,
> If among the crumbling ages
> Still their name survives."

It was chiefly through the spoken word that Edward Delafield conveyed his knowledge to two generations of students. As early as 1823 he gave clinical lectures on ophthalmology at the infirmary. These were purposely held during the session of the College of Physicians and Surgeons so that the undergraduates might take advantage of them. The lectures were very popular, filling a great need, and were continued over many years. It was not until 1866 that the college established an eye clinic over which Cornelius R. Agnew, who had received his training at the infirmary, presided.

Fig. 6. New York Hospital.

On every occasion Delafield evinced his interest in ophthalmology. Although he wrote no famous book and made no striking discovery, yet, by preparing the way for others to do these things,

he left us greatly in his debt. Projecting his aid to the infirmary as far into the future as it was possible for him to do, he bequeathed it the sum of $5,000, "in trust, to invest and apply the interest or income to the management of a free bed." An equal sum was bequeathed to the Society for the Relief of Widows and

Fig. 7. Elenor Langdon Elwyn.

Orphans of Medical Men. He had, however, already given money from his private funds to both institutions, being always reluctant to demand of others what he would not do himself.

And now to lift the curtain of his private life: Edward Delafield was twice married. By his first marriage in 1821 to Elenor Langdon Elwyn, a granddaughter of John Langdon, United States Senator and Governor of New Hampshire, six children were born. His wife died of "galloping consumption" at the age of 35 years, and, one after another, as they grew up, the children died of the same disease. He had high hopes for his eldest son, Edward Henry Delafield, a graduate in medicine of the College of Physicians and Surgeons of the class of 1848. Young Delafield was a brilliant student and a youth of the greatest promise. One day, while "walking" the wards of one of the great London hospitals, he was stricken with a hemorrhage from the lungs. Hastening back to America, he died at sea, of "phthisis pulmonis," aged only 23 years.

By his second wife, Julia Floyd, whose paternal grandfather was General William Floyd, a signer of the Declaration of Independence, Edward Delafield had five children. His son by this marriage, Francis Delafield, followed in his father's footsteps. After graduating from Yale he entered the College of Physicians and Surgeons, receiving his medical diploma from the hands of his father in 1863. Not being permitted to take part in the stupendous struggle of the Civil War that was raging in the South, Francis Delafield was sent abroad to continue his work, studying general medicine in Paris and ophthalmology in Vienna. He became a famous pathologist, was honored by Yale with an LL.D., and was destined to perpetuate the name of Delafield in the medical world.

Edward Delafield was a resident of New York City all his life, and it appears that he seldom if ever went far from his home town, for he was much too busy. His city house, which he built, was at No. 1 East Seventeenth Street. Any prominent physician visiting New York was almost sure to be entertained at his elegant and hospitable home. His family moved in an exclusive and cultivated society. His summer home, "Felsenhof," at Darien, Connecticut, still stands today, much as he left it, a mid-Victorian structure occupying an eminence overlooking Long Island Sound. If he could come back from the land of shadows—and while I speak there seem to be hovering over us the spirits of those long departed—he would have us know about his country seat and the way in which he lived. In the wide hall of the house there

are six shallow semicircular alcoves, which, in his day, were occupied by marble busts of his medical friends. As was the English custom, he aimed to make the place self-sustaining. Everything used on the table was grown there. Even the waters were utilized, oysters and clams being reclaimed from the river and fish from the sound. There was a tidal dam, and a tidal mill where corn grown on the place was ground. The only foods purchased were sugar, tea, and coffee. Behind the house there was an enormous English garden with box walks, which must have reminded him of his father's gardens a "Sunswick," in which he loitered in carefree boyhood. He had an affection for the noble horse, and was wont to be driven behind fine trotters between "Felsenhof" and New York.

The household had an English air about it. Family prayers were held daily and had to be attended by all the members as well as by the servants. Of a religious nature, he was brought up in the Episcopal Church, of which he was a communicant and a vestryman. On his inward life the rites and ceremonials of that ancient church must have acted and reacted untold times. He was not only a great man, but he was a good man—one of those rare individuals who really practice their religion. He considered the use of tobacco a pernicious habit. In one of his annual charges to the graduating class he inveighed against the use of alcohol for medicinal purposes, but he kept a wine cellar that must have been well stocked, for in his will he directed that his wines be divided into six equal parts for distribution among his heirs. He was fond of astronomy, and the telescope that he used is still at "Felsenhof."

Toward the end of his life he measured five feet eight inches in height and weighed about 150 pounds. His eyes were blue, and in younger years his hair was reddish. Two portraits of him, one in youth and the other in old age, hang in the governors' room at the infirmary, and two busts of him are housed under the same roof. Another portrait of him is at the Academy of Medicine and one is owned by Roosevelt Hospital. Says Carlyle: "Human portraits, faithfully drawn,

Fig. 8. Edward Delafield in old age.

are of all pictures the welcomest on human walls."

On Delafield's return to town from "Felsenhof," in the autumn of 1874, it was evident that his strength was failing, and that he was dwindling away in "the lean and slipper'd pantaloon." Hugh Reiley, his coachman for 25 years—"friend and coachman" as he called him in his will—would come into the house to help carry him upstairs at bedtime and to administer to him during his last months "in age and feebleness extreme."

What changes in the world in general, and in medicine in particular, were encompassed in the one and 80 years of his earthly pilgrimage! Napoleon had won his greatest victory at Austerlitz, and had been exiled in defeat and gloom after Waterloo. Delafield was at the zenith of his reputation when the great cable across the Atlantic was laid, and the dome of

city hall burned at the illumination in celebration of the first message received through the transatlantic cable. He saw this country annex, either by purchase or by war, Louisiana, California, Florida, and Alaska. In his youth most of the country beyond the Mississippi was inhabited by savages and wild beasts.

He saw the advent of what he termed "the milder medicine." Patients were no longer bled to death, as it was claimed the Father of His Country had been, when he needed all the strength that he could muster. Patients were no longer drugged with opium and rum, nor held or strapped to the operating table, things he had witnessed in his student days. Crawford W. Long, a country practitioner in Georgia, had given the first nitrous ether in the history of surgery, and had converted a scene of mortal agony, through "magic sleep" into one of tranquillity, free of pain.

Edward Delafield died on February 13, 1875. A vast concourse of mourners gathered under the lofty arches of Trinity Church and crowded the sides of the adjacent street to pay tribute to him and to his brothers, Rufus and Henry Delafield, whose bodies lay before the altar beside his own. Singularly all three, the last survivors of seven brothers, had died within three days. Their lives had been prolonged far beyond the biblical allotted span. They were eminent men, each one an honor to his family and a credit to the city of his birth.

In estimating the character of Edward Delafield a contemporary paper stated that many of his original ideas were "so incorporated in the works of the day that it would be difficult to give him all the credit justly his due."

The chaplain and a trustee of the College of Physicians and Surgeons, who came often in intimate contact with him, the Rev. Sullivan H. Weston, in his memorial sermon portrayed him as I would have all those here present picture him to have been. He said: "He was eminently scholarly, with cultivated literary tastes; his language was at once chaste, select, and forcible. He was a great favorite with his students. While affable to his intimate associates, he was at the same time dignified and reserved in his general manners. He knew how to resent an impertinence and check forwardness and presumption. No one who knew him ever thought of taking a liberty with him—his stately manner would at once rebuke any undue familiarity."

Of all that our first president witnessed and accomplished during the days of his years only a tithe has been brought to light out of the distant past, but of it we have learned enough to seek the grace to emulate a noble, fruitful, and inspiring life.

THE TREATMENT OF TRACHOMA WITH SULFANILAMIDE

A REPORT OF 31 CASES*

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Favorable results in the treatment of trachoma with sulfanilamide or related compounds have been reported by Loe,[1] Heinemann,[2] Lian,[3] Dik,[4] Hirschfelder,[5] Kirk, McKelvie, and Hussein,[6] Jasseron and Morard,[7] Dejean and Roux,[8] Richards, Forster, and Thygeson,[9] Burnet, Cuénod, and Nataf,[10] Gradle,[11] Burnier,[12] Burnier and Lech,[13] Harley, Brown, and Herrell,[14] and Julianelle, Lane, and Whitted.[15] Most of these observers ascribed a definite curative effect to the drug but several reported improvement only, particularly in the corneal manifestations of the disease. Wilson[16] reported no effect with prontosil rubrum in the treatment of one series of trachomatous Egyptian children who had minimal or no corneal activity. More recently, however, he[17] appears to have had success with active corneal disease. Busacca[18] had no success in the use of sulfanilamide locally. It is noteworthy that most reporters have described the promptness with which the subjective and objective symptoms of corneal trachoma have subsided under the influence of the drug in contrast to the relatively slow change in the conjunctival disease.

The prognosis for trachoma as observed in the outpatient clinic has in the past been very unfavorable, on account of the lengthy period required to effect a cure and the great difficulty of maintaining the patient's coöperation for the necessarily frequent and painful treatments. Patients, as a rule, seek treatment only for their acute or subacute exacerbations, particularly when corneal ulceration or trichiasis is present, with the result that their disease continues active over a period of many years. Examination of the records shows that at the Vanderbilt Clinic and Institute of Ophthalmology trachoma patients have been no exception to this rule. It seemed, therefore, that the possibility of spontaneous healing could be ruled out, and that rapid healing, if it was obtained, would necessarily be significant. Since March, 1938, all trachoma patients seeking treatment—a total of 34—have received sulfanilamide. Of these, 31 have completed their courses and their cases are reported here. I am indebted to Drs. J. H. Dunnington, R. Pfeiffer, R. Castroviejo, and D. B. Kirby for allowing me to follow and report on their seven cases. Although the series is a small one, it is representative of all stages and complications of the disease. Most of the cases had received sporadic local treatment—some at intervals over a period of many years—but six had never received any form of therapy.

Whenever possible, the patients were hospitalized for a period of from 10 days to two weeks, and were placed on a sulfanilamide dosage sufficient to give an average blood concentration of 5 mg. per ml. or higher. As a rule, however, it was necessary to conduct the treatment in the outpatient clinic, with low dosages varying in the adult from an average of 30 grains to a maximum of 40 grains daily, in divided doses, given with equal amounts of sodium bicarbonate. Treat-

* From the Department of Ophthalmology, College of Physicians and Surgeons, Columbia University, and the Institute of Ophthalmology of the Presbyterian Hospital, New York. Read before the American Ophthalmological Society, seventy-fifth annual meeting, at Hot Springs, Virginia, June 5-7, 1939.

TABLE 1

Data on cases treated with sulfanilamide

Case No.	Name	Sex	Age	Stage of Disease	Cornea*	Inclusion Bodies	Bacteriology		Sulfanilamide Dosage†	Result
							Before Treatment	After Treatment		
1	S. C.	M	30	Stage III	Fourth-degree pannus, both eyes	Present	Normal flora	Unchanged	50 grains daily for three days; then 30 grains daily for seventy days	Arrest
2	B. W.	F	53	Acute trachoma at onset	First-degree pannus, both eyes	Numerous	Normal flora	Unchanged	60 grains daily for five days; 40 grains daily for three days; then 20 grains daily for two days	Rapid arrest
3	L. G.	F	25	Acute trachoma at onset	First-degree pannus, both eyes	Numerous	Normal flora	Unchanged	75 grains daily for thirteen days	Rapid arrest
4	S. M.	F	29	Stage III	Fourth-degree pannus, both eyes	None found	Normal flora	Unchanged	30 grains daily for forty-two days	Arrest
5	A. L.	M	43	Stage III	Fourth-degree pannus, both eyes	None found	Normal flora	Unchanged	70 grains daily for five days only	Arrest
6	P. P.	F	11	Stage I	First-degree pannus, both eyes	Present	Normal flora		45 grains daily for three weeks	Arrest
7	J. G.	M	40	Stage IIb unilateral	Second-degree pannus	Numerous	Staphylococcus aureus	Unchanged	30 grains daily for nine weeks	Arrest
8	L. Y. S.	F	44	Stage III	Third-degree pannus and ulceration, both eyes	Present	Right eye normal; left eye, Haemophilus influenzae	Normal flora both eyes	60 grains daily for fifteen days; then 40 grains daily for six weeks	Arrest
9	M. D.	F	45	Stage III	Third-degree pannus, both eyes and ulceration	None found	Normal flora	Unchanged	20 grains daily for seven weeks	Arrest
10	G. G.	F	38	Stage III	Third-degree pannus, both eyes	None found	Normal flora	Unchanged	30 grains daily for six weeks	Arrest
11	S. S.	F	14	Stage IIa unilateral	Fourth-degree pannus crassus, limbal follicles	Present	Normal flora	Unchanged	25 grains daily for six weeks	Arrest
12	V. M.	M	28	Stage III unilateral	Fourth-degree pannus	Present	Normal flora		30 grains daily for three ten-day periods	Arrest
13	J. R.	M	38	Stage IIa-III	Second-degree pannus with ulcer, left eye	Present	Normal flora	Unchanged	50 grains daily for ten days	Arrest
14	W. L.	M	35	Stage IIa-III	Second-degree pannus with ulcer, right eye	None found	Normal flora	Unchanged	60 grains daily for ten days; then 40 grains for three days	Arrest
15	A. A.	F	43	Stage III	Second-degree pannus O.D. Third-degree pannus crassus, O.S.	None found	Normal flora	Unchanged	40 grains daily for three weeks	Arrest O.D. Epithelioma of cornea O.S.
16	G. D.	M	50	Acute trachoma at onset	First-degree pannus	Numerous	Normal flora	Unchanged	60 grains daily for two weeks	Arrest
17	K. D.	F	40	Stage IIa	Second-degree pannus	Present	Normal flora	Unchanged	40 grains daily for two weeks	Marked improvement

17	K. D.	F	40	Stage IIa unilateral	Second-degree pannus	Present	Normal flora	Unchanged	40 grains daily for two weeks	Marked improvement
18	J. R.	F	45	Stage IIa unilateral	Second-degree pannus	Present	Normal flora	Unchanged	40 grains daily for three weeks	Marked improvement
19	S. S. U.	F	44	Stage IIa-III	Second-degree pannus, both eyes	Present	Normal flora	Unchanged	45 grains daily for three weeks; then 30 grains daily for two weeks	Improved
20	I. G.	F	29	Stage III	Third-degree pannus, both eyes	None found	Staphylococcus aureus	Unchanged	30 grains daily for ten days	Improved
21	B. C.	F	28	Stage IIa-III	Second-degree pannus, right eye; third degree, left eye	Present	Normal flora	Unchanged	40 grains daily with intermissions for two months	Marked improvement, followed by recurrence
22	M. S.	M	75	Stage IIa-III	Fourth-degree pannus, both eyes	Present	Right eye, normal flora; left eye, Haemophilus influenzae (dacryocystitis)	Unchanged	55 grains daily for four days; then 40 grains for six days	Improved
23	M. D'A.	M	45	Stage III with xerosis	Fourth-degree pannus, both eyes	Present	Hemolytic streptococcus, E. coli	Unchanged	30 grains daily for five weeks	Improved
24	M. J. K.	M	44	Stage III	Fourth-degree pannus with ulceration, right eye	None found	Normal flora	Unchanged	50 grains daily for twelve days	Rapid improvement; probable arrest
25	Q. M.	M		Stage III	Third-degree pannus, both eyes, with pterygia	None found	Staphylococcus aureus, both eyes	Unchanged	30 grains daily for six weeks	Improved
26	H. H.	M	43	Stage IIa-III	Second-degree pannus both eyes, with ulcer, right eye	None found	Normal flora	Unchanged	40 grains daily for three weeks	Rapid relief of keratitis
27	J. F.	F	63	Stage III	Second-degree pannus, both eyes, with severe keratitis, right eye	None found	Normal flora		40 grains daily for one week	Keratitis improved
28	P. N.	M	45	Stage IIb–III	Second-degree pannus, both eyes	None found	Loaded with Haemophilus influenzae and Diplococcus pneumoniae	Unchanged	50 grains daily for two days; 90 grains daily for five days	Corneal improvement but conjunctival disease unchanged
29	P.	M	55	Stage III with xerosis	Fourth-degree pannus, both eyes	None found	Variable flora; occasional pathogens	Unchanged	30 grains daily for five weeks	Unchanged
30	F. C.	M	76	Stage III	Fourth-degree pannus, both eyes	None found	Right eye, non-hemolytic streptococcus; left eye Haemophilus influenzae	Unchanged	Neo-prontosil 40 grains daily for three weeks	Unchanged
31	C. A.	M	50	Stage III with severe xerosis, right eye	Fourth-degree pannus, both eyes	None found	Both eyes loaded with saprophytes and various pathogens	Unchanged	30 grains daily for six weeks	Unchanged

* Extent of pannus measured in four degrees, the first degree indicating an incipient pannus, and the fourth degree, a complete vascularization of the cornea.
† Sulfanilamide generally given with equal amounts of sodium bicarbonate in four divided doses, the last just before retiring.

ment was then continued over periods varying from five weeks to two months. In all cases complete blood studies were made twice weekly.

Effect of sulfanilamide therapy. In Table 1 the essential data on the 31 treated cases are summarized. It will be seen that sulfanilamide effected an apparent healing without recurrence to date in 16 cases while 11 were improved and 4 were unimproved. The 16 cases classified as healed include both early and late cases, and cases treated on low and high dosages. They include 3 cases of acute trachoma at onset, which healed after therapy lasting only 11, 13, and 14 days, respectively, and other cases in which treatment over a period of many weeks was required. In cases exhibiting severe corneal symptoms the effect of sulfanilamide therapy was most dramatic, photophobia disappearing sometimes within the first 24 hours, and ulceration and infiltration healing during the first week. This rapid corneal response is illustrated in case 3, which showed circumcorneal injection, limbal edema, subepithelial infiltration, incipient pannus, and severe epithelial keratitis (fig. 1). After 13 days of treatment, all photophobia had disappeared, the bulbar conjunctiva had become white, the pannus vessels were no longer dilated, and the subepithelial infiltration and epithelial changes (fig. 2) had disappeared. There was dramatic conjunctival response in the three cases with acute symptoms: conjunctival discharge ceased almost at once, papillary hypertrophy disappeared, and in a few weeks the conjunctiva had returned to normal. In the chronic follicular cases exhibiting only mild inflammatory signs, however, conjunctival response was always much slower than in the cases with corneal lesions. The improvement was manifested in a progressive thinning and paling of the membrane over a period of weeks, but the follicles themselves disappeared only after a delay of from 8 to 12 weeks. It is interesting to note that in one patient (no. 11), who exhibited limbal follicles, absorption

Fig. 1 (Thygeson). Biomicroscopic appearance of cornea of right eye of case 3 prior to sulfanilamide therapy. Severe congestion of the bulbar conjunctiva, swelling and infiltration of the limbus region, subepithelial infiltrates, and the extension of superficial vessels into the cornea are shown. The fine punctate epithelial lesions are not apparent.

of the follicles was no more rapid than in the case of conjunctival follicles. Thus it would appear that the relatively avascular lymphoid tissue of the trachoma follicle absorbs much more slowly than the cellular infiltration producing the papillary hypertrophy. Furthermore, it appears that absorption of follicular material may continue long after the drug has been discontinued.

The 11 cases classed as improved all showed satisfactory amelioration of subjective symptoms—particularly those derived from the cornea—but all continued to show at least some degree of conjunctival inflammation. In some instances (nos. 20 and 22) this activity appeared to be due, in part at least, to secondary bacterial infection which had not been influenced by the sulfanilamide therapy. Only one of the 11 cases (no. 24) received the full therapeutic dosage; the others were treated in the outpatient department on low dosages.

The four cases classified as unimproved following sulfanilamide therapy included no early cases and none in which epithelial-cell inclusions had been found. All were in the cicatricial stage. Three showed advanced xerotic changes, with heavy secondary bacterial infection. It was difficult in these cases to determine the degree of trachomatous activity or to differentiate it from the activity caused by secondary infection, by cicatricial changes, including trichiasis, or by irritation from xerosis. In this connection it is of interest to note the experience with sulfanilamide in a case of severe papillary conjunctivitis with blepharitis and corneal changes, which was at first incorrectly diagnosed as trachoma, but later was shown to be a severe Staphylococcus aureus infection. Here sulfanilamide failed to influence either the conjunctival or the corneal changes, whereas immunization and local antiseptic therapy eventually produced striking improvement. In an earlier series two cases of severe staphylococcic infection complicating trachoma failed to respond to local antitrachomatous therapy, but yielded readily and completely to specific antistaphylococcic therapy. Thus it would seem possible that, at least in some of these sulfanilamide-resistant cases, the

Fig. 2 (Thygeson). The same eye as in figure 1, 14 days after beginning sulfanilamide therapy. The bulbar congestion, limbal hypertrophy, subepithelial infiltrations, and epithelial lesions have disappeared.

trachomatous activity may have disappeared, and that the inflammatory signs remaining after treatment were the result of secondary factors.

Effect of sulfanilamide on the inclusion bodies. Sixteen of the 31 cases showed readily demonstrable inclusion bodies. They were relatively scarce in the chronic cases, but numerous in the acute ones (nos. 2, 3, and 16). Sulfanilamide therapy resulted in the rapid disappearance of the inclusions, and in no case were they found after the third day of treatment. In the three acute cases they disappeared very abruptly on the third day, and could no longer be found in spite of repeated examinations. Shortly before the inclusions disappeared they showed changes in their staining reactions to the Giemsa stain, the elementary and initial bodies presenting a fuzzy appearance and staining poorly. It is an interesting observation that 10 of the 16 cases showing inclusion bodies were healed.

Effect of sulfanilamide on secondary bacterial infection. Sulfanilamide appeared to have little or no effect on secondary bacterial invaders, including the predominating ones, Haemophilus influenzae, Diplococcus pneumoniae, and Staphylococcus aureus. This was particularly apparent in those cases (nos. 28, 29, 30, and 31) in which secondary infection was prominent. It is noteworthy that case 23 still had betahemolytic streptococci in the conjunctival sac after the sulfanilamide course had been completed. Sulfanilamide had no effect on the complicating dacryocystitis obtaining in two cases.

Influence of the stage of the disease. In this small series of cases it is evident that sulfanilamide acted more promptly and effectively in the early stages of the disease than in the late, complicated stages, an experience which has been borne out in the treatment of Indian school children at Fort Apache, Arizona. But although acute trachoma at onset responded particularly well, cases showing considerable cicatricial change also made good recoveries (nos. 1, 4, 5, 8, 9, 10, and 12). All stages of trachomatous pannus responded to the drug, the response being most rapid in the cases of incipient pannus (nos. 2, 3, 6, and 16).

Influence of sulfanilamide dosage. In this series it would seem that the full therapeutic dosage over a period of two weeks or longer is more effective than a low dosage continued over a longer period of time, although arrests were obtained by both methods. That a remarkably low dosage can possess therapeutic action is evident from case 9, in which a daily dosage of 20 grains over a period of seven weeks effected an arrest of activity.

Toxic reactions. Severe toxic reactions occurred in two cases (nos. 2 and 22), and consisted of a dermatitis in one and of fever in the other. One patient complained of cardiac distress during the treatment, and in others there were mild gastric discomfort, malaise, and headache. There were no significant blood changes during the treatment in any of the 31 cases.

Discussion

The results obtained in this series confirm the claim of Loe and others that sulfanilamide exerts a definite curative effect on a high percentage of active trachoma cases. That this effect is primarily on the trachoma virus itself rather than on secondary invaders is clearly indicated by the striking results obtained in pure, uncomplicated cases and by the uniform disappearance of the epithelial-cell inclusion bodies characteristic of the active disease. It is perhaps too early to conclude as to the permanency of the healing but no one of the 16 patients classed as healed has had a recurrence to

date after observation periods varying from 3 to 22 months.

It would seem that dosage and treatment time are probably the two most important factors in explaining the varying response of trachoma to sulfanilamide. The importance of adequate dosage is well shown in the two series reported by Richards, Forster, and Thygeson[9] and by Forster[19] in which almost uniform healing was obtained on a daily dosage of one-half grain per pound continued for three weeks or longer. In contrast to this are the relatively poor results (20 percent healing) obtained by Julianelle, Lane, and Whitted who employed the lower dosage originally recommended by Loe. In therapeutic experiments with sulfanilamide now in progress on the closely related disease, inclusion blennorrhea, the importance of treatment time is shown by the fact that adequate treatment over periods of seven days or longer has effected healing whereas the disease has recurred after treatment lasting five days or less. The shortest treatment period resulting in healing of trachoma was 10 days in this series. This patient (case no. 2) has had no recurrence during an observation period of 14 months. This would seem to indicate that with adequate dosage treatment time could be considerably shortened.

Summary and conclusions

In a series of 31 cases of trachoma treated with sulfanilamide, 16 were healed, 11 showed satisfactory improvement, and 4 exhibited little or no change. The drug appeared to be most efficacious in the early cases and when employed in relatively high dosages, but healing was obtained in certain long-standing cicatricial cases and in some in which low doses were given over a relatively long period of time. Sulfanilamide effected rapid disappearance of the epithelial-cell inclusions characteristic of active trachoma, but seemed to have little influence on secondary bacterial infection caused by Haemophilus influenzae, Diplococcus pneumoniae, or Staphylococcus aureus. Corneal lesions responded more rapidly than conjunctival ones, and papillary hypertrophy regressed much more rapidly than follicular hypertrophy.

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NOTES, CASES, INSTRUMENTS

ANGLES ALPHA, GAMMA, AND KAPPA

CASE REPORT

CHARLES KELLEY MILLS
Woodland, California

The presence of a positive angle alpha (gamma or kappa) gives the patient the appearance of having a divergent strabismus; that of the negative angle simulates convergent strabismus. Also, if these angles are present in a case of true strabismus, they make the true deviation appear to be greater or smaller than it actually is, depending on the type of the strabismus, and of the associated angle.

Angle alpha of Donders, OKA, is formed by the optic axis and the visual line.

Angle gamma, OCA, is formed by the optic axis and the line of fixation.

Angle kappa of Landolt, also OKA, is formed by the pupillary line and the visual line.

Angle alpha is positive when the optic axis lies to the temporal side, and negative when it lies to the nasal side of the visual line.

Angle gamma is positive when the optic axis lies to the temporal side, and negative when it lies to the nasal side of the line of fixation.

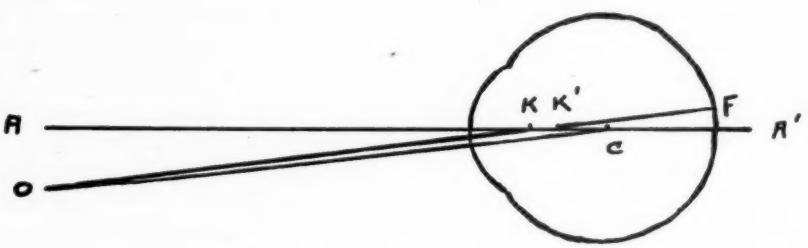

Fig. 1 (Mills). Illustrating angles alpha, gamma, and kappa.

For the sake of clarity the following definitions are listed:

AA′, optical axis, and in this figure also pupillary axis; O, point of fixation; F, fovea; C, center of rotation; K, K′, nodal points.

The optical axis, AA′, is a line through the anterior and posterior poles of the eye.

The pupillary line, also AA′ in this diagram, passes through the center of the pupil.

The visual line, OF, connects the point of fixation and the fovea.

The line of fixation, OC, connects the point of fixation and the center of rotation of the eyeball.

Angle kappa is positive when the pupillary axis lies to the temporal side, and negative when it lies to the nasal side of the visual line.

Angle kappa is measured by occluding one eye and centering the other on the fixation device of the perimeter. While the patient looks directly at the fixation device, the observer keeps his eye directly behind a small light which is placed at the center of the perimeter and moved along the arc until the corneal reflex is in the center of the pupil, at which point the size of the angle is read. If, when the light is at the center of the perimeter, the corneal reflex is to the nasal side of the center of the pupil so that the light

must be moved templeward, then the angle is positive; if vice versa, then the angle is negative.

Case report. Miss R. Y., aged 15 years, whose general physical examination including Wassermann reaction and urinalysis was negative, presented herself for examination with the complaint that her eyes had diverged as long as she could remember.

Examination (positive findings only): Distance vision without glasses was O.D. 20/100, O.S. 8/200; muscle balance 8 prism diopters of esophoria for distance and 3 prism diopters of esophoria for near; convergence near point 5 centimeters. Third-degree fusion was present. The patient gave the appearance of having a divergent strabismus of about 24 prism diopters, which was due to 12 degrees of positive angle alpha (gamma, kappa) in each eye.

Under atropine cycloplegia the ametropia was corrected with O.D. − 3.00 D. sph. ⊂⊃ + 4.50 D.cyl. ax. 105° to permit vision of 20/30; O.S. −3.50 D.sph. ⊂⊃ + 5.25 D.cyl. ax. 75° for vision of 20/40.

Bilateral, congenital, equal, symmetrical medial subluxation of each crystalline lens was present, but the lateral edge of each lens could be seen only when the pupil was well dilated. Neither lens showed iridodonesis and each was quite clear except for a very few fine opacities seen only with the slitlamp. Except for the distortion due to the high degree of mixed astigmatism present, the fundus was normal.

Recommendations were (1) glasses for constant wear, (2) no surgery of the extraocular muscles.

Comment: The writer believes the pseudo-exotropia to be due to a positive angle alpha (gamma, kappa) which is caused by the ectopia lentis. This equal medial decentration of the crystalline lens gives the lens a base-in prismatic effect and therefore rays of light which, for example, normally would strike the fovea are deviated toward the base of the prism and thus directed to the nasal side of the fovea. In order to preserve single binocular vision the fovea assumes the more nasal position, rotating the optic and pupillary axes so that they lie to the temporal side of the visual line and in this way create a positive angle alpha (gamma, kappa).

An interesting sidelight to me is the girl's story that in seeking advice from several men who were licensed by law to examine eyes (but who were not doctors of medicine) she was in every instance advised that glasses could in no way benefit her and that she should have an ocular-muscle operation.

Woodland Clinic.

A TEST FOR BINOCULAR VISION

PARTICULARLY APPLICABLE TO THE EXAMINATION OF AMBLYOPIC CHILDREN*†

(MODIFIED WORTH TEST)**

CONRAD BERENS, M.D.
New York

Although the Worth four-dot test[1] and its other modifications[2, 3] are practical for the study of binocular vision in adults at 6 meters and 25 cm., these tests are confusing to some young children. Moreover, for certain amblyopic children and adults the test objects are so small that perception may be hindered at both 6 meters and 25 cm. Many amblyopic patients can see only the 60-meter letter at 6 meters and at the near point can see only 6-meter type. For this reason the size of the test objects has been increased so that at

* Presented before the American Ophthalmological Society, June, 1939.

** Made by Clairmont and Nichols Co., New York, N.Y.

† Aided by a grant from the Ophthalmological Foundation, Inc.

6 meters a 90-meter object is used and at the near point, a 6-meter object.

To make the test more applicable to the examination of younger children, characters which they usually can recognize have been selected. Instead of using four dots, which have been found to be confusing in some cases, the test consists of three characters, an elephant, a sail boat, and a child with outstretched arms (fig. 1). The test is performed in a manner similar to the Worth test, which naturally stimulated the development of this test.

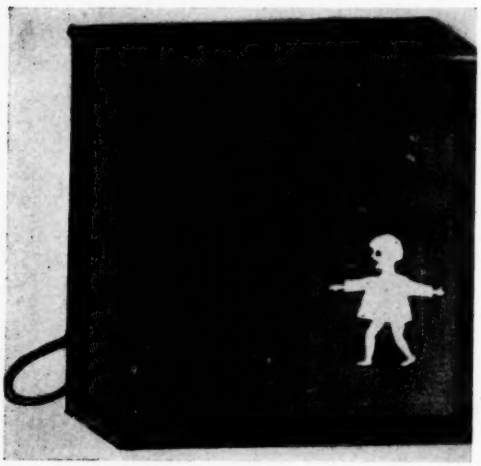

Fig. 1 (Berens). A test for binocular vision (modified Worth test) for use at 6 meters.

Method. In both the 6-meter and the near tests (fig. 2), the upper aperture, outlining an elephant, transmits a red light, the lower figure of the sailboat a green light, and that of the child a white light.

With a green glass before the left eye and a red glass before the right eye, if the patient sees only the red elephant above, and the child appears reddish white, he is using only his right eye. However, if he sees three objects, one red, one green, and the child below which may become reddish white, greenish white, or gray, both eyes are being used and he has at least first-grade binocular vision. If he is using his left eye only, he will see a green sailboat and a green child. If he sees a green sailboat, a red elephant, and a red and a green child, diplopia is present.

Advantages. The advantages of the test are that (1) the objects are large enough so that the majority of amblyopic patients will not be handicapped by their low visual acuity; (2) the characters used are recognized by children of from 3 to 3½ years of age, and (3) for young children the test seems to be less confusing than is the Worth four-dot test or the recent modifications.[2, 3]

Fig. 2 (Berens). A test for binocular vision (modified Worth-Hardy test) for use at 25 cm.

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A UNIQUE CASE OF RADIATING FOLDS OF DESCEMET'S MEMBRANE

T. T. CHOW, M.D. AND L. W. CHANG, M.D.
Chengtu, Szechwan, China

Folding of Descemet's membrane is mentioned by Fuchs[1] in his textbook as "striate opacity of the cornea." The term "deep striate keratitis" is variably used. It refers to the appearance that may be caused in any deep keratitis by optic-tissue rifts and folds in Descemet's membrane.[2] This has been studied anatomically and clinically by many other investigators, such as Becker, Laquer, v. Recklinghausen, Hess, and Schirmer. The slit-lamp has given ophthalmologists[3, 4, 5] much light on the structure of the cornea, and Vogt[6] has described and illustrated a number of unusual pictures, especially the appearance of double-contour reflex lines as the clinical striate opacities or the folds of Descemet's membrane. *In China* such an illustration of folds in Descemet's membrane has not been recorded in the literature. We venture to present here a unique case of radiating folds in Descemet's membrane associated with adherent leucoma in an atrophic bulb.

REPORT OF A CASE

S. K., a Chinese farmer, aged 22 years, was admitted to the Chengtu Eye, Ear, Nose, and Throat Hospital on February 22, 1938, because of blindness of the right eye for one year. One year previously, while the patient was cutting bamboo, his right eye was accidentally pierced on the temporal side of the limbus by the pointed tip of a piece of bamboo. At that time he felt a very sharp, cutting pain in the eye. Afterwards he noticed a tiny fragment of bamboo in the superior temporal periphery of the cornea. He pulled the fragment out himself. There was no bleeding. The wound was very small. He did not know whether his eye had been perforated or not. His vision remained fairly good. Two days later, redness, slight pain, photophobia, epiphora, and blurred vision began to be noticed in that eye. On the third day, these symptoms became much worse. Headache also developed on the right side. A white spot or mass was noticed in the pupillary region on the fourth day. It became a dirty yellow patch on the fifth day. One week after the injury, vision served only to count fingers. Living far out in the country where he could not obtain proper medical care, he suffered a great deal of pain in the injured eye, accompanied by frequent attacks of unbearable headache, for about six months. While the attacks of these acute symptoms gradually subsided, the eyeball became smaller and smaller. On admission, the right eye was found sunken in the orbit; it had only light perception.

The patient stated that he had suffered from repeated attacks of redness and lacrimation of both eyes for the past 10 years, chronic nasal catarrh and toothache in the past 5 years, and frequent sore-throat in the past 8 years. His family history was essentially negative.

General physical examination. The patient was well developed and well nourished. Both middle meati were found to have mucopurulent discharge. Transillumination revealed darkness of both maxillary sinuses. The tonsils were moderately enlarged and very full of crypts, from which pus could be expressed. The mouth had marked gingivitis and dental caries. The anterior cervical glands were easily palpable. The examination of the rest of the body was not remarkable. The Kahn test of the blood was negative; so were other laboratory findings.

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*From the Chengtu Eye, Ear, Nose, and Throat Hospital.

Ophthalmologic examination. The right eye was reduced in size and sunken in the orbit. The exophthalmometer readings were O.D. 8.0 mm. and O.S. 15.0 mm., The lids were retracted and somewhat atrophic. The palpebral fissure was very much narrowed; the lacrimal apparatus normal. The palpebral conjunctiva had a few follicles and some scars and was slightly injected. The bulbar conjunctiva was also slightly injected, with a pigmented spot located on the nasal side midway between the caruncle and the limbus, in appearance like a nevus. There was mild ciliary injection. The size of the cornea was reduced.

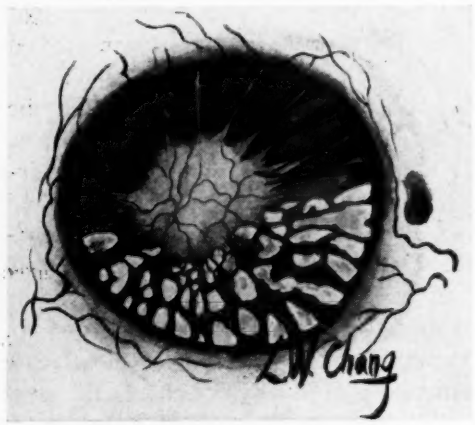

Fig. 1 (Chow and Chang). Cornea of the right eye as seen through a magnifying glass. The folds of Bowman's and Descemet's membranes are clearly shown.

The following measurements of the corneas of the two eyes were taken for comparison:

	O.D.	O.S.
Transverse diameter	9.0 mm.	11.5 mm.
Longitudinal diameter	10.0 mm.	12.0 mm.

The cornea of the right eye was almost flat and was more or less oval in shape, its major axis running transversely. Its anterior surface was studded with multiple elevations. A cottonlike, white opacity occupied its middle third, involving the entire thickness of the stroma. The edges of the opacity were fuzzy, with processes extending to the periphery of the cornea. The superior portion of the cornea had a few superficial blood vessels which appeared like pannus. On the whole it was clear, but the inferior half of the cornea had irregular snowflakelike mottlings. Some of the latter were discrete, whereas the rest were confluent (fig. 1). The sensibility of the inferior portion of the cornea was reduced, while the superior portion remained normal. The anterior chamber was obliterated in the center and very shallow in the periphery. The pupil was obscured by the corneal opacity. Repeated instillation of atropine could not dilate it. The iris, which was atrophic and brown in color, was attached to the leucoma.

The left eye had trachoma of stage III with few follicles and scars. Otherwise it looked normal.

Slitlamp examination of the right eye. The anterior surface of the cornea was slightly curved. It was almost flat in the pupillary area. The epithelium was uneven with stipplings. The whitish flakes of opacity in the inferior part of the cornea were rather superficial and resembled calcium deposits. Apparently they lay in the epithelial layer and did not extend into the stroma. Between these flakelike opacities there were superficial threadlike, wavy furrows radiating from the leucoma to the periphery. The thickness of the whole cornea was diminished. The pupillary margin of the iris was completely adherent to the posterior surface of the cornea, constituting a typical seclusio pupillae. The transverse diameter of this secluded zone was twice as great as the longitudinal one. Hence the cornea was roughly divided into a superior clear area and an inferior opaque one. Folds of Descemet's membrane were faintly visible near the edge of the ad-

herent leucoma. These folds became more prominent farther away from the center. They appeared as yellowish, glassy, double lines under direct and indirect illumination. There were dots of brown iris pigment on the posterior surface of the cornea. The aqueous in the periphery of the anterior chamber was clear. The iris was smooth and reddish brown in color. It did not respond to stimulation with a bright light. It was atrophic (fig. 2).

The tension taken with Schiötz tonometer was O.D. 4.0 mm. Hg; O.S. 20.0 mm. Hg.

Vision: O.D. Light perception at 2 meters, light projection poor; O.S. 6/6.

Diagnosis: O.D. Atrophic bulb with adherent leucoma, radiating folds of Bowman's membrane and Descemet's membrane and pupillary seclusion.

Enucleation of the right eye was strongly urged, but the patient refused.

Comment

The mechanism that brings about the folding of Descemet's membrane is chiefly dependent on the natural anatomical structure—a homogeneous, glassy membrane that is very elastic and very resistant to both physical and chemical agents. But, unlike Bowman's membrane, Descemet's membrane is sharply differentiated from the stroma of the cornea. Once its continuity has been impaired either by trauma, as in perforation or operative incision, or by diseases, such as rupture of a deep corneal ulcer, this membrane will separate from the adjacent stroma fibers and let the aqueous or lymphatic fluid or exudates infiltrate the corneal fibers, so that the retained fluids will keep the folds constantly formed. Diseases like parenchymatous keratitis, chronic iridocyclitis, and phthisis bulbi, which lower the intraocular tension, often bring about folding of Descemet's membrane. As the outer protective coats shrink in size, the elastic membrane is pressed into folds. A severe trauma or a large incision of the cornea may even detach this membrane. One of the writers (L. W. C.) saw a case of this nature in Shanghai. Descemet's membrane was detached when a cyclodialysis was performed on an eye with acute glaucoma. In cases of injury these folds are usually observed as gray streaks within 24 hours. They extend from the wound and always run at right angles to the axis of the wound (Fuchs). However, sometimes they may be concentric or radiating, depending upon the kind of injury or lesion.

Fig. 2 (Chow and Chang). Center of cornea of right eye viewed with the slitlamp, showing greater detail of the folds of Bowman's and Descemet's membranes.

In our case the puncture made by the bamboo fragment was said to have been at the limbus of the right eye at the 10-o'clock position. When the patient extracted the foreign body by himself he might have altered the course of the wound. During either the penetration or the exit of the foreign body, or both, the endothelium and Descemet's membrane

might have been injured. The escape of aqueous after perforation would lower the intraocular tension immediately. The anterior chamber becoming very shallow, the iris could adhere to the wound. Or, the withdrawal of the foreign body could carry the iris to the cornea. The entrance of an exogenous infection into the eye through the perforated spot can readily explain the acute inflammatory symptoms and the rapid loss of vision, as described in the history.

The foci of infection, such as chronic sinusitis, chronic tonsillitis, and dental caries probably did not contribute much to the ocular pathology. The signs of frequent attacks of severe pain of the right eye and unbearable headache on the same side for half a year were apparently due to acute exacerbation of iridocyclitis and secondary glaucoma resulting from adhesions of the iris. Local malnutrition and poor circulation led to the atrophy of the whole eyeball.

The striate opacity caused by operation usually disappears in a few days if there is no infection (Fuchs). In our case the radiating folds persisted. This can be explained by the result of a combination of factors: The perforation of the cornea, the subsequent inflammation of the anterior segment of the eyeball, and repeated attacks of secondary glaucoma, the formation of adherent leucoma, and finally the atrophy of the bulb.

The superficial calcium deposits in the opaque areas of the cornea were the product of degenerative changes. The superficial wavy furrows were folds or wrinkles in Bowman's membrane, which, like those in Descemet's membrane were the result of injury.

The writers are indebted to Dr. Eugene Chan for his advice and criticism.

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USE OF THE SHAHAN THERMOPHORE IN HYPOTONY OF THE EYEBALL AS A RESULT OF THE ELLIOT TREPHINING OPERATION*

Hans Barkan, M.D.
San Francisco

It occurs not infrequently that after a successful trephining operation the result as regards the lowered tension is very satisfactory except for one fact; namely, that it is too satisfactory. In other words, we are faced with a hypotony of the eyeball. The intraocular tension by the McLean tonometer may register as low as 4 to 10 mm. Hg. This hypotony is usually not an immediate result of the trephination but occurs about two or three months later. In some cases intraocular tension has been reduced to a satisfactory point for several months and then hypotony has taken place rather rapidly. In such cases the patient has noted sudden dimness of vision and sometimes a slightly tender eyeball. This may

* From the Department of Ophthalmology, Stanford University Medical School.

be due to the release of the normal pressure on the ciliary body. The anterior chamber is almost completely abolished, and there is usually a rather prominent trephine bleb. If the hypotony lasts for a number of weeks, a moderate iridocyclitis may deevlop. The hypotony is certainly not desirable.

In attempting to raise the tension, we have tried various methods of diminishing the fistula drainage in addition to such methods as the subconjunctival injection of dionin or salt solution and others designed to stimulate greater secretion of fluids. Recently Shahan's thermophore has been used very successfully for this purpose. A small tip was applied at a temperature of 165° to 170°F.

Dr. Shahan states that he has never used the instrument for this purpose, that he does not know of anyone else who has, and has never seen a reference to it in the literature. I therefore believe that it would be profitable to point out to my colleagues that this instrument may be used to reduce the elevation of the bleb. This causes a thickening of the tissues of the bleb, thereby inducing a lessened filtration into it and a slower distribution time of the liquid accumulated there. A rise in tension is thus effected in the hypotonic eyeball. The area of the bleb is gently touched in various places for a period of 5 or 10 seconds at a time with an interval of a few seconds before again applying the tip. This is done on a number of occasions; four in my particular case, separated from each other by an interval of several days.

At the end of two weeks the formerly greatly elevated, balloonlike, and transparent bleb had become transformed into one much denser and flatter, and the tension of the eye in this instance rose to 18 mm. Hg. The anterior chamber became a little deeper and the vision again rose to its former value.

We have then, in all probability, another useful purpose for the Shahan thermophore, an instrument which has shown itself to be successfully applicable in a variety of ocular conditions.

Stanford University Hospital.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

NEW YORK EYE AND EAR INFIRMARY

Ophthalmological clinical conference

March 27, 1939

Dr. Sigmund Agatston, *chairman*

Unusual case of nuclear sclerosis, each eye

Dr. D. Blair Sulouff presented an unusual case of this condition. The patient was a heroin addict, and had been taking the drug (80 grs. daily) for about 18 years. It was suggested that an optical iridectomy be performed, but Dr. John S. Cregar suggested that a broad-based iridectomy above would be the better procedure.

Discussion. Dr. Isaac Hartshorne thought Dr. Cregar was right in suggesting a broad-based iridectomy rather than an optical iridectomy. He felt that the cataract would develop further. He told of a patient with a similar condition whom he had treated 15 years ago. Dr. Hartshorne did a preliminary iridectomy on each eye, and eight years later removed the cataracts.

Dr. Sigmund Agatston said that he had performed a preliminary iridectomy in a similar case. He said that the pupil should be dilated first to see if vision can be improved.

Dr. Sulouff said that since this man had been taking heroin for 18 years the dilator fibers had not had much exercise. The cumulative effect of the heroin did not permit the homatropine to act.

Animal-eye fundi drawings

Dr. Arthur A. Knapp showed drawings of numerous animal-eye fundi.

Discussion. Dr. Isaac Hartshorne said that Lindsey Johnson did some work on animal eyes at the London Zoo about 30 years ago, and asked Dr. Knapp if he was familiar with this work.

Dr. Loren Guy asked if rabbits have glaucomatous cupping of the eye normally, and Dr. Knapp replied that they have a deep cupping. Dr. Guy disagreed with this statement, and said that he had examined many rabbits' eyes and did not see this deep cupping.

Dr. D. Blair Sulouff asked if the ringtail monkey's eye resembles the human eye most closely, and Dr. Knapp replied that it did.

Case of partial occlusion of the temporal artery

Dr. R. G. Thornburgh presented a case of partial occlusion of the temporal artery in a man, aged 24 years. Examination showed the lower temporal branch of the artery to be occluded, and surrounding this was an area of ischemia that reached up to the fovea. No foci of infection were found.

Discussion. Dr. Sigmund Agatston said he saw the patient when he first came to the clinic. The elevation was out of proportion to the occlusion of a vessel of this size. The patient was admitted to the hospital and showed improvement two days later, but then suffered a loss of vision again. There was some process going on that was recurrent, and the patient had some sort of allergic manifestation. He had an ischemia that was undoubtedly of vascular origin. Dr. Agatston thought this condition was due to some toxin.

Corneal transplant

Dr. Donald Hall reported a case of corneal transplant in a 60-year-old male.

The patient had seen only hand movements with the right eye, but after a successful transplant, his vision was now 20/70 in that eye.

Discussion. Dr. Donald Bogart said that the question sometimes comes up before operation as to the condition of the anterior chamber. We have a means of prognosticating this condition through the infrared rays by taking serial pictures of each cornea at different levels, using a red filter and infrared ray. This process is still in its infancy, but will have a bearing in selecting cases for corneal transplant in the future.

Tuberous sclerosis

Dr. Birna Nystrom of Grasslands Hospital reported a case of tuberous sclerosis. At the age of two years the patient began to have seizures that recurred until he was five. At nine these seizures began again and increased in severity. There is a numbness in the left wrist before onset of the seizure. He becomes tonic, and turns his head to the left. Psychometric examination showed an I.Q. of 71. Eye examination showed a vision of 20/20 O.U.; fields normal to form; external examination negative; the cornea, pupil, and anterior chamber normal. The pupils did not hold contraction well, but reacted to light. Ophthalmoscopic examination showed the left eye to be normal. The right eye showed the disc in fairly sharp outline, slightly elongated vertically. The macula was clear, but just above it was a lesion. A second large lesion was found at the periphery in the temporal field—irregular, raised, grayish mulberrylike patches. There was a third lesion below the level of the disc. Over the disc was a smaller tumor containing a single cyst, and a small flat tumor fairly sharply defined.

Juvenile glaucoma

Dr. Arthur Chandler reported a case of juvenile glaucoma which had been presented at the previous meeting. An extracapsular extraction of the lens of the right eye had been performed, giving vision of 20/50.

New tangent-screen rule

Dr. Loren Guy presented a tangent-screen rule that he had designed. The triangular rule has three surfaces marked in tangents of degrees—one for one meter, one for two meters, and one for three meters. The entire device can be made for about one dollar and greatly facilitates making field studies at different distances using an unmarked screen, the rule then being rotated about the fixation point to relate the pins to the tangents of degrees for the given distances marked.

Donald W. Bogart,
Secretary.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on ophthalmology

March 16, 1939

Dr. Alexander G. Fewell, *chairman*

Recovery of normal vision following a rupture of the cornea

Dr. Mary Buchanan presented the case of a 19-year-old colored girl who had been in an automobile accident and sustained a transverse wound of the left cornea, the temporal extremity of which contained some prolapsed iris. The rest of the iris had disappeared. There was blood in the anterior chamber and deep ciliary injection. The tension was minus. Treatment consisted of cold compresses, atropine, metaphen and boric irrigations, following which the eye healed and a vision of 6/7.5 was obtained.

Discussion. Dr. H. Maxwell Langdon reported a case he saw about six or seven years ago. A young man was driving a car, turned the corner and ran into a parked milk wagon. The tail board was down and loaded with milk bottles and the front of the car was completely broken in by striking the edge of the tail gate. Dr. Langdon removed four pieces of glass from the lids. The left cornea was cut across the middle and into the sclera about one millimeter on each side. There was no prolapse of the iris and the anterior chamber was completely emptied. A conjunctival flap was formed and a complete recovery obtained with 6/5 vision. In cases of this kind he is very much in favor of the conjunctival flap.

The determination of sulfanilamide in the aqueous and vitreous following administration

Dr. Willard G. Mengel said a number of investigations had been made to determine the diffusion of sulfanilamide into the ocular fluids following conjunctival and oral administration. A negligible amount was absorbed in the aqueous following instillation in the cul-de-sac, whereas the concentration of the drug in the aqueous and vitreous was 1.5 to 3.2 mg. percent following the administration by mouth. The rapidity of the diffusion of the drug into the vitreous was shown by the presence of sulfanilamide in the vitreous 32 minutes following its administration by mouth.

Exophthalmos due to arteriovenous aneurysm

Dr. Stirling S. McNair said that most of the cases of arteriovenous aneurysm causing exophthalmos, as reported in the literature, had, as one of their cardinal symptoms, pulsation of the proptosed globe. In this reported case pulsation was not present. He felt justified in classifying this as a case of arteriovenous aneurysm possibly connecting the internal carotid artery with the cavernous sinus, as all the remaining cardinal symptoms were present.

The patient, E. H., female, aged 65 years, was admitted to the hospital on August 3, 1938, complaining of slight headache, a buzzing sensation in the left orbital region, throbbing pain in the left eye, and loss of vision in the left eye. The above symptoms had become progressively worse in the four days previous to her admission. She had known that she had heart disease for the past 20 years and only recently had she been told that she had high blood pressure. Examination of the eyes on admission revealed the right eye to be normal with the exception of moderate retinal arteriosclerosis and overfull and dark veins. The left eye showed marked swelling of the lids, ecchymosis of the conjunctiva and subconjunctival tissues, and marked proptosis. There was a marked increase in intraocular tension. The pupil was semidilated and immobile to light but reacted consensually with the other eye. On examining the fundus, the optic disc was found to be dusky in appearance, the nasal borders barely visible, and the remaining margins of the disc obscured by swelling. The arteries were thin and dark and pulsated while the veins were dark and full. No hemorrhages or exudates were seen. A bruit was heard, systolic in time, over the orbital and temporal regions. The patient had marked auricular fibrillation, pulse 120 per minute, and a blood pressure of 190/108. The laboratory and X-ray findings were essentially negative.

Due to the patient's poor physical condition, no surgery was advised, and a course of manual digital compression was instituted on August 4, 1938, over the left common carotid artery. On Septem-

ber 8th the bruit completely disappeared and the patient developed a peripheral facial paralysis on the left side, which the neurologist thought was due to the continuous application of wet dressings over the eye. The tension of the eye was above 95 mm. Hg with the McLean tonometer, and an exposure keratitis developed. The patient was discharged on October 5, 1938, and at that time the exophthalmos and chemosis had gradually subsided, the hypopyon was nearly absorbed, and the facial paralysis was slightly less. Intraocular tension was markedly increased and there was no vision in the left eye. A red reflex was seen with the ophthalmoscope, but no fundus details could be made out. The patient was only able to abduct the eyeball slightly. She was next seen on March 3, 1939, and on examination the left eye presented the same condition as on her discharge from the hospital except that the bruit had returned, was continuous in character, and was only heard over the eyeball. This bruit was also heard by the patient. The only explanation for the disappearance of the bruit for seven months, and its return, is, he believes, that a thrombus may have formed in the aneurysm which caused the bruit to disappear, and later the thrombus recanalized allowing the blood from probably the internal carotid artery to communicate again with the cavernous sinus, thus causing a return of the bruit.

At present the patient is in fairly good general physical condition and the right eye has remained practically normal. This case, showing marked exophthalmos, complete external and internal ophthalmoplegia, acute glaucoma, ulcer of the cornea, complete peripheral facial paralysis, and complete blindness, well demonstrates the damage that can be wrought to an eye by an aneurysm located posterior to the globe.

REMOVAL OF ORBITAL TUMORS

DR. JOHN H. DUNNINGTON stated that the transconjunctival approach is entirely satisfactory for the deep-seated growths and advocated its use in preference to the resection of an osteoplastic flap. In a series of 49 orbital tumors it was not necessary to resort to the Krönlein method in any instance.

Warren S. Reese,
Clerk.

SAINT LOUIS OPHTHALMIC SOCIETY

March 24, 1939

DR. B. Y. ALVIS, *president*

THE INSERTION OF THE LEVATOR TENDON

Dr. H. ROMMEL HILDRETH read a paper on this subject which will be published in this Journal.

Discussion. Dr. B. Y. Alvis said that the fact that the aponeurosis of the levator is joined by the orbital fascia, and that this united structure then is inserted into the skin of the upper lid, had been recognized and described by anatomists many years ago. Dr. Hildreth has succeeded, in these dissections, not only in demonstrating the reality of this sturdy structure while older descriptions left the impression that it is something rather indefinite and insignificant, but also has devised a practical means of utilizing the structure surgically.

Correction of ptosis is not a simple problem. No one method can be employed in all types of ptosis cases, and the results in some of them are rather a makeshift at the best.

The best result that can be hoped for is that which elevates the lid to its proper position, provides the natural skin creases, and permits the lid to follow the eye movements up and down and to close easily in sleep and winking. If there is

any power in the levator, it is desirable to utilize it as far as possible and to avoid disturbing the integrity of the superior-rectus attachments as well as the unsightly browlifting that comes from making use of the frontalis.

Many operations have been described for enhancing the action of the levator by advancing its insertion. Some, as Bowman, brought this about by excising a strip of the tarsus. Others, as Eversbusch and Lapersonne, drew the tendon forward in a loop; and others shortened it. Snellen sought to shorten the levator by sutures alone, without incision, and described a method of inserting the sutures that would advance all the elements of the levator insertion, Mueller's muscle, levator tendon, and the tarso-orbital fascia together. If successful, this operation would utilize the tendon insertion into the skin as does Dr. Hildreth's. The fact that this rather simple procedure never came into more general use suggests that it is ineffective.

The description of the incision in the operative procedure of Eversbusch is as follows:

"An incision the length of the lids is then made parallel to the lid border and half way between it and the eyebrow, through skin and muscle. . . . The upper and lower lips of the wound are then separated from the fascia and tarsus by loose dissection, so as to lay bare the tendon of the levator" (quoted from the American Encyclopedia of Ophthalmology, volume 45, page 10495).

Such an incision passes through the tendon insertion into the skin, and the dissection upward and downward exposes tarsus and the tenuous fibers of Mueller's muscle which are picked up in the sutures and advanced. The strong tendinous skin insertion must escape shortening, hence the unsatisfactory results of this as of most attempts at advancement of the tendon.

The excision of a strip of tarsus, as in the operation of Bowman, Grandmont, Gruening, and others, also is in effect a shortening of Mueller's muscle.

The Blaskowicz suture operation is probably more effective than most of the others because it provides for greater shortening of the levator-tarsus unit and probably because some of the skin-tendon fibers are picked up in dissecting from the conjunctival aspect to expose the tendon and muscle, although the description of the dissection seems to lead to the isolation of Mueller's muscle only and its insertion into the upper tarsal border.

Dr. Hildreth has shown how to expose and suture the strong fibrous tendon of the levator, how to attach it at the proper place on the tarsus, and how to judge at the time of operation whether the suture is at the right place and, if it is not, replace it.

He wished to emphasize the necessity of advancing a broad strip of the tendon and gauging the point of attachment of the medial and lateral sutures in the tarsus as carefully as the first center suture. If these sutures are placed too high on the tarsus, the center of the lid will be raised more than outer and inner portions and there will be a peak of the upper-lid margin. If the side sutures are placed too near the lid margin, the result will be a tendency to draw the lid border to an angle at the inner and outer aspects, giving a rectangular effect to the palpebral fissure.

As stated by Dr. Hildreth, block anesthesia is an important factor in the success of this operation, as it leaves the field of operation undistorted, and one can judge the effect when the sutures are placed; if too much or too little elevation is secured, the sutures can be removed and reinserted higher or lower as need be.

Advancement of the skin-tendinous insertion alone has a tendency to exagger-

ate the loose fold of skin of the lid and obliterate the natural crease even while elevating the lid margin satisfactorily. To avoid this, it is advisable to excise an elliptical strip of skin and the underlying orbicularis and to close the skin wound with sutures that bite deep into the tarsus, so that the skin will be held in a natural-appearing crease by the resulting scar which, of course, will not be visible in the skin except as a crease.

His own limited experience with this operation has been rather satisfactory and he commends Dr. Hildreth for working out a technique based on anatomic studies that makes advancement of the levator tendon an effective procedure.

Dr. Hildreth, in closing, presented three slides to illustrate his method of producing anesthesia. A lid clamp is somewhat in the way and he believes, in general, the operation can be done better without the clamp.

Report on three conditions with eye and nose and eye and ear pathology

Dr. Guerdan Hardy read a communication on the above subject which has been published in this Journal (1940, v. 23, pp. 315, 446, 562).

Discussion. Dr. A. D. Calhoun said the patient that he saw, an 11-year-old boy, had noticed the symptom of night blindness for two years. The family history was negative. The eye grounds, as stated, did show the typical appearance of bone corpuscles in the periphery. The lamina cribrosa was not evident. The vessels and arteries were attenuated. The examination of the fundus of the sister of this boy, who had no symptoms at that time, showed a scattering pigment in the mid-periphery. A Wassermann test of the boy was negative. No spinal puncture was made. The family was in poor circumstances and could not afford the extra laboratory work. The child is to return in six months for further observation and a possible spinal puncture (see p. 315).

Dr. Guerdan Hardy, in closing, said the X-ray plates show the frontal and maxillary sinuses and ethmoids. Very frequently we see cloudiness of the ethmoid sinuses when there is an infection of the antrum. The reason it was hard to diagnose this patient is that most of the cases seen in Children's Hospital will show some proptosis of the eyeball. This case had normal movement and no proptosis. No pus was expressed from the sac. Since there was a possibility of ethmoiditis, it was not wise to wash through the sac and possibly spread the infection (see p. 562).

Adolph C. Lange,
Editor.

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A SYMPOSIUM ON ORTHOPTIC TRAINING

Defects in coördination of the extrinsic ocular muscles have multiple significance. They may embarrass the patient psychically, and they may interfere with his visual efficiency or ability to compete in the economic battle of life.

A definitely squinting eye may work an enormous amount of harm in the development of the child's personality. It tends to produce a devastating sense of inferiority and abnormality, although in some cases one finds it hard to be certain that the squint is not merely one of a group of anomalies, of congenital basis, which depend upon defective germ plasm.

The economic disadvantages associated with a squinting eye are seldom overwhelming. They constitute rather limitations as to the type of occupation than a condemnation to failure. The ocular infirmity may even act as a stimulus to greater effort and determination, for it is clear that obstacles are at least as frequently sources of strength as of weakness. Many persons with a squinting eye (and certainly many more with only one useful eye) have achieved brilliant success in various trades and professions, not excluding that of aviation in which binocular vision is commonly regarded as superlatively necessary.

Not every one will agree with the English ophthalmologist who some years ago expressed to the writer the opinion that "a slight cast in one eye made a woman much more interesting." Yet even phys-

ical attraction is not invariably spoiled by a deviating eye.

Among experts it is a matter of rather common observation that eyestrain, especially as manifested by headache, is more likely in the presence of binocular than monocular vision. This fact has probably some relation to the cause of strabismus, which seems in many instances to arise from the unwillingness of the brain or nervous system to make the exaggerated effort toward coördination which is called for by a marked hyperopia or a marked refractive difference between the two eyes.

In spite of all these "defences" or "excuses" for strabismus, the profession of ophthalmology and the general public will desire increasingly to overcome defects of oculomotor coördination, since they represent imperfection in the most important and indispensable of our sense organs. Hence the popularity of the movement toward orthoptic training, and the desire of ophthalmic surgeons to satisfy themselves how far they may trust the enthusiasm of its apostles.

It must not be forgotten that the history of ophthalmology indicates a tendency to adopt and later to abandon various enthusiastically advocated methods for the treatment of muscular defects. The widespread use of prisms, of muscle exercises, and of surgical procedures, have all had their heyday and their eclipse, somewhat comparable with the fate of the surgery of the paranasal sinuses among the otolaryngologists, or the abuse of oöphorectomy among the gynecologists. But perhaps the new light in treatment of the ocular muscles is here to stay!

For those who have not yet made up their minds concerning the benefits to be derived from orthoptic training, a useful assembling of the arguments for and against will be found in the systematized discussion of the subject which opened the program of the Oxford Ophthalmological Congress for 1939 (Transactions of the Ophthalmological Society of the United Kingdom, volume 59, part 2, pages 491-577).

Law, who frankly suggests that his invitation to speak on the subject may have depended partly on a previous attitude of opposition, in which he "was possibly guilty of the debating-hall device of overstating my case in order to drive home my point," directs a number of criticisms against the more enthusiastic advocates of orthoptic training.

Defining the function of the orthoptist as "doing work of a special kind which the ophthalmic surgeon is too busy or too lazy to do," Law points out that there is a rather obvious danger that the ophthalmologist will abandon his patients too completely to the lay orthoptist, whose medical foundation must of necessity be inferior to his own. " . . . the practice of orthoptics, on account of its adoption by a large and increasing number of medically unqualified persons, has practically reached the position of a vested interest, and . . . needs but the uncritical acceptance of the kindly if somewhat lazy acquiescence of the majority of ophthalmic surgeons to be assured of a future."

Law further suggests that the amount of supervision exercised by an ophthalmic surgeon in the handling of a case under orthoptic training is often very inadequate, rather by fault of the surgeon than of the orthoptist. There is an economic side to the problem which should not be overlooked. The loss of school time by the child, and of time and money by the parents, is often every great, and it is necessary to consider very carefully whether the practical benefit to the child is enough to compensate for these sacrifices.

The expenditure of time and money may impress the family with so great a sense of importance of the treatment as to induce an attitude of anxiety and worry which is out of proportion to the benefits conferred. A great percentage of all cases of muscular imbalance, especially if early subjected to the ordinary forms of treatment, will show satisfactory cosmetic results with freedom from eyestrain. With full correction of the refractive error, supplemented by any ultimately necessary operative work, the child might not experience any substantial disadvantage in future years.

Moreover, in the ordinary conditions of daily life, there seems reason to doubt whether the power of fusion and the increased visual acuity produced under the special mental and physical conditions of orthoptic training will be available for application to instantaneous and involuntary fusion such as is achieved by the normal subject. Many at least of those subjected to orthoptic treatment appear to lose their newly acquired faculties some time after discontinuance of the treatment. Perhaps one half of the cases of squint can be cured without orthoptic help. In estimating gains and losses from the training of large groups of children, it is necessary to consider further the important number of subjects for whom treatment is completely unsuccessful even after expenditure of time and money. The risks arising from the attempt to administer professional care through those whose education is professionally inadequate for the purpose are not limited to the lay orthoptist, whose knowledge of refraction is often far from sufficient. They include the encouragement afforded to the optometric quack who deceives his clients into believing that all the ocular ills that flesh is heir to may be relieved by so-called eye exercises with an imposing piece of mechanical apparatus.

Against the criticisms of Law and others must be weighed the more favorable opinions of a number of sincere and capable observers, including Lyle, whose comprehensive treatment of the subject precedes Law's contribution. Orthoptics must be used, not as an independent cure-all, but as an adjunct to optical and surgical treatment. It must also be preceded by occlusion of the seeing eye whenever the two eyes do not already possess fairly equal visual acuity. As in other conditions, good results are more likely from early than from late treatment.

In this connection Lyle quotes a suggestion by Chavasse that every newborn child should be examined ophthalmoscopically and that the refraction of every infant should be estimated at the age of twelve months.

Lyle warns against attempting orthoptic treatment in cases of congenital paresis of both external recti, or before the patient is old enough to benefit by the treatment, or after it has been shown that the treatment already given has not led to any improvement. The person who undertakes the work of training should be able to diagnose the presence of an abnormal retinal correspondence, or, in an adult, of inability to fuse. Lyle mentions one case in which annoying diplopia followed six years of orthoptic treatment, supplemented by an operation which gave a good cosmetic result, in a patient with alternating convergent squint from congenital paresis of both external recti. A like undesirable development may arise in patients who cannot fuse and whose eyes are straightened by operation. Where an alternating squint dates from birth, especially if there is a family history of this sort of anomaly, the chance of obtaining binocular vision is extremely remote and orthoptic training a waste of time.

Lyle finds that unilateral divergent strabismus with normal retinal corre-

spondence yields a cure by orthoptic training alone in about fifty percent; and the alternating type gives a somewhat higher percentage of cures. Orthoptic treatment combined with operation has afforded seventy percent of cures in these cases. For heterophoria which induces disturbing symptoms Lyle considers orthoptic treatment to be "unrivaled." He states that in ninety percent of the cases of convergence insufficiency all the symptoms are relieved.

The orthoptist should give treatment only to patients who have been referred by an ophthalmologist, and should not advise the patient concerning the desirability of operation. She should, however, be encouraged to discuss with the ophthalmologist the line of treatment and should report at an interval of one to three months as to the amount of progress made by the patient.

Prearranged discussion at the Oxford Congress included eight short opening papers beside the two longer ones above mentioned, and the volume of Transactions further prints eleven pages of impromptu discussion of the subject.

A number of significant questions which arise in dealing with this matter can be answered definitely only after many years of painstaking and difficult follow-up work. It is common knowledge that the so-called "lazy" eye, the eye which appears perfectly normal and yet does not manifest a corresponding visual acuity, can sometimes obtain momentarily vision better than its usual record. Will the orthoptically trained eye prove, in many instances at least, to have made a special effort which it will be unable to sustain in the hurly-burly of daily life? Of the eyes in which orthoptic training appears to have done something which could not otherwise have been accomplished, will the majority, years after orthoptic training has ceased, show a disappointing incompetence for coöperation with the better eye; or will they maintain that improvement of coördination which was displayed at the end of the training period? We may have to wait a good many years before this and other questions are answered conclusively.

W. H. Crisp.

DIRECTORY OF MEDICAL SPECIALISTS

"Under whose care were you in your home town, Mrs. Jones?"

"Dr. Blank's. Do you know him?"

"No, I don't believe I do, but if you will wait a minute I may be able to find out something about him. Let me see, yes, here is his name; and though I don't know him personally, the fact that he is listed here as certificated by the American Board of Ophthalmology guarantees that he is scientifically and ethically well qualified. I am sure that if you liked him you will do well to return to him when you go home."

What a satisfaction it has been during the past 20 years to have had this convenient directory of well-trained ophthalmologists; increasingly valuable as more and more physicians have appreciated the importance of certification and have been certified.

In 1924, the otolaryngologists followed the example of the ophthalmologists by forming a board. Then, in 1931, the dermatology and syphilology board was organized, and in rapid succession followed the remaining medical branches, with two affiliates of surgery—anesthesia and plastic surgery—14 in all.

It early became apparent that some central group to coördinate these boards would be necessary. So in 1933-34 the Advisory Board for Medical Specialties was formed, composed of representatives from the following organizations: American Board of Ophthalmology, American

Board of Otolaryngology, American Board of Obstetrics and Gynecology, American Board of Dermatology and Syphilology, The Association of American Medical Colleges, The National Board of Medical Examiners, The Federation of State Medical Boards of the United States of America, The American Hospital Association, and The Council on Medical Education and Hospitals of the American Medical Association.

All of the specialty boards agreed to be governed by the rulings of this group while maintaining their own integrity. One of its important actions has been the recent publication of a volume* containing the names of some 14,000 doctors certificated by the boards.

The book is divided into several sections: the first includes a history of the formation of the general Advisory Board and an explanation of the purpose behind this movement in medicine to specify a group of physicians of proved excellence; the second, a history of the formation of each board, its aims, and such other matters as the requirements for certification in its particular branch, and an alphabetical list by states and cities of those certificated in each specialty, with a brief outline of the training and medical affiliations of each; and third, an alphabetical list of all certificated by every board.

It is obvious that this book should be very valuable to physicians and even to the laity because of its convenient size, low cost, and simple and complete arrangement of data. To be sure, it has been possible to get much information about physicians from the data in the Directory of the American Medical Association, including the listing as certified by the appropriate board, but the absence of some of the factors mentioned has rendered this directory a limited accessibility. One can, of course, telephone a colleague, and if lucky enough to find him in his office—but, for some reason, his office hours never correspond with your own—he may be able to give some information. However, he so often cannot, that after a few unsuccessful trials this method is usually abandoned. The knowledge of the existence of these boards and their work will spread in time beyond physicians to hospital boards and finally to the laity, and it is not unlikely that many people will begin to expect their doctors to hold this certificate of special qualification to practice the particular branch of medicine in which they specialize. Whether this will prove an unmitigated blessing may be questioned, but it is not unlikely to happen.

One thing stands out prominently; namely, that with the increasing importance of the boards there will be increasing dominance by them. This may well prove an evil matter for medicine. Especially important is it, therefore, that no group or groups shall control these boards. The present method of appointing a fixed number of representatives from the different national societies in each specialty is a good means of preventing this, but another important point is that there should be a constant change of membership of the board except for the secretary. No device to circumvent this, such as the immediate reappointment of a member by one society when he has just served a term as appointee from another society, should be used.

It is to be hoped that this new catalogue will be subscribed to, not only for the benefit of the individual physician but also because a wide distribution will greatly increase the value of the book and will enable the publishers to issue the necessary additions every two years, as planned.

Lawrence T. Post.

* Directory of medical specialists certified by American boards. Paul Titus, M.D., directing editor. Clothbound, 1,573 pages. New York, Columbia University Press, 1940. Price $5.00.

VITAMIN A AND DARK ADAPTATION

Almost one hundred years ago, cases of softening of the cornea, occurring in infants and young children, began to be reported; and the names keratomalacia and xerophthalmia came into use. Colonel Wright has said that at Madras, India, there have been more cases of blindness from this disease than from ophthalmia neonatorum. In 1866 Lobo reported cases, occurring in Brazil, associated with bad nutrition in Negro children. The same year Blessig reported it in Saint Petersburg, as being caused by prolonged fasting in Lent. In 1883 Weeks, of New York, reported a case due to bad nutrition. In 1915 it began to be understood, from animal experiments, that the disease was due to dietary deficiency of fat-soluble vitamin A. In 1924 Blegvad published in a monograph and in the American Journal of Ophthalmology accounts of the cases occurring in Denmark from 1909 to 1920, a total of 434 cases. The bulk of these cases occurred during the World War, reaching their maximum in the early months of 1916 and 1917, at the time when cow's milk and milk foods were being sent into Germany. When normal milk and milk foods became available, the number of cases decreased immediately. Blessig connected xerophthalmia with hemeralopia; and in 1907 Schiele noticed it occurred in nurslings whose mothers suffered from hemeralopia.

It is now proposed by Harris and Abrasy (Lancet, December 23 and 30, 1939) that dark adaptation shall be used as a test for vitamin-A deficiency. From experiments begun in 1937, which demonstrated that poor dark adaptation is a reliable test of the presence, and somewhat of the extent, of vitamin deficiency, they found that of 100 poor-class children attending elementary schools, 57 were below standard for dark adaptation but rose to normal when treated with large amounts of vitamin A. Among 30 well-fed children, 28 had good dark adaptation. The test chiefly relied on was that of the Birch-Hirschfeld photometer. This was a black disc with five openings, giving different degrees of illumination. When all these were recognized the adaptation was normal. When one, two, or three of them were not seen, different degrees of poor adaptation were indicated. The test was applied repeatedly in each case, the eyes being prepared by ten minutes in complete darkness. They conclude that the theoretical basis for the test is reliable; and that it is capable of detecting deficiency, although not of assessing the different degrees of defect. They found vitamin-A deficiency less common among adults than in children.

In using dark adaptation to test for vitamin-A deficiency, we must remember that the adaptation is rapid at first, Adler indicates, for a half-hour; but it goes on for hours before it is complete. Instead of the ten-minutes darkness, used by the experimenters in securing their statistics, it would be better to have the eye in darkness for a half-hour, or even longer. For the individual case we can not depend on the averages that may be reached in an extended original investigation. We should use longer periods of darkness and always repeat the test.

EDWARD JACKSON.

BOOK NOTICES

TRANSACTIONS OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY, Volume 37, 1939. Clothbound. 467 pages. Philadelphia, Wm. Fell Co., 1940.

The transactions of the seventy-fifth meeting of the society are given. Twenty-eight papers presented by the members of the society are reported.

Dr. Harry Friedenwald's address "The

American Ophthalmological Society; a retrospect of 75 years" is of historical interest. This society was the first in this country devoted to a special field of medicine. The clinical interests of American ophthalmologists have remained remarkably constant over the past 75 years. Problems of experimental research are present in 8 percent of the publications of the last 10 years.

The papers by Von der Heydt, Burke, Bedell, Asbury and Vail, Gamble, Burch, Jackson, Samuels, and Thygeson have been or will be published in this Journal.

A report of the biomicroscopic appearance of 218 eyes after cataract extraction was given by Cowan and McDonald, who concluded that successful intracapsular extraction results in a better eye than does extracapsular extraction. There is no justification for performing a simple extraction.

From the work on experimental cataract in the albino rat, Yudkin and Greer offered these clinical implications: A patient with early lens changes should be instructed (1) as to personal hygiene; (2) to utilize a well-balanced diet; (3) to correct, if possible, gastro-intestinal dysfunction; and (4) to adjust vascular decompensation.

Lloyd of Brooklyn reported a family with lattice dystrophy of the cornea.

Schoenberg, delving in the speculative field of psychosomatic relationships, considered their therapeutic implications in glaucoma. Cases were reported to make the relationship between anxiety, worry, emotional stress, and glaucoma apparent. The value of psychotherapy is implied.

The detection of early changes in the visual field was discussed by Traquair, who stressed the use of the tangent screen at two meters, using a 1-mm. test object.

Gifford and Cushman discussed retinopathies due to changes in the lamina vitrea. Hyaline deposits on the lamina vitrea, "drusen," may cause a form of central retinopathy by pressure or displacement of the visual cells.

MacDonald reviewed six cases of Lindau's disease. The successful treatment of the disease with the apparent relief of symptoms seems possible.

Davis presented a thoroughly investigated case of plexiform neurofibromatosis of the orbit.

Shahan described a method of checking the temperature of the contact surface of the thermophore against the known melting points of thymol, palmitic acid, trional, and acetamid. A temperature of 115°F. to 125°F. for stimulation of indolent ulcers; of 140°F. to 145°F. for most corneal, conjunctival, and dermal neoplasms; and of 152°F. to 158°F. for pneumococcal ulcers was recommended. The thermophore application should completely cover the involved area and should be made for a period of one minute.

Arnold Knapp discussed the course of 11 cases of optic atrophy with cupping and low tension. Cupping of the optic disc with tension may be caused by disturbances in the nutritional vessels of the optic nerves. Glaucoma therapy is of questionable benefit.

Friedenwald, Buschke, and Michel presented experimental work substantiating their conclusion: "The loss of ascorbic acid (vitamin C) from the excretory system of the eye results in a decrease in the rate of secretion of the intraocular fluid."

Verhoeff critically discussed binocular fixation and heterophoria. A new test for hyperphoria, making a distinction between horizontal and vertical binocular fixation, was introduced.

The effect of anoxemia on dark adaptation in the normal and vitamin-A–deficient subject was discussed by Adler and McDonald. The rise in the threshold due to anoxemia is the same in the normal as

in the vitamin-A–deficient state.

Wagener, Cusick, and Craig discussed the retina in surgical cases of primary hypertension. The classification of diffuse arteriolar disease with hypertension into groups 1 and 2, including those individuals with vascular changes in the retina but without retinitis—that is, without hemorrhages or exudates—was used. Groups 3 and 4 included those individuals with retinitis, group 4 being reserved for those with measurable edema of the discs. Subdiaphragmatic section of the splanchnic nerves was the operation of choice. Good results were obtained in 40 percent of those without retinal arteriosclerosis; failure occurred in 82 percent of those with marked retinal arteriosclerosis. Improvement in the retinal lesions was found in 30 percent. The ophthalmologist who has an understanding of the classification used may be of real service to the internist and the neurosurgeon.

The ocular lesions of Boeck's sarcoid, which is a granulomatous disease of the lymph nodes, lungs, bone marrow, and spleen, were described by King. The ocular lesion, a nodular uveitis, is secondary to the general involvement. Recovery is the rule.

New instruments and appliances were presented by Berens, MacDonald, and Stieren.

The optical principles of telescopic spectacles were presented by Eggers.

The papers presented uphold the high standards of the American Ophthalmological Society, and this volume is a worthy memorial to the seventy-fifth annual meeting.

William M. James.

THE PATHOLOGIC HISTOLOGY OF THE LACRIMAL GLAND. By Magda Radnót. 59 pages, 14 photomicrographs. Supplement to Ophthalmologica, S. Karger, Basel, 1939.

Until recently, the pathologic histology of the lacrimal gland has been almost neglected. Since the majority of histologic findings has been determined on clinical material or biopsies, the pathologico-histology of the lacrimal gland in the textbooks has shown deficiencies. Especially is this true in regard to the description of degenerations. The material for the present study included both orbital lacrimal glands from 500 cadavers of individuals varying in age from the newborn to those 90 years old. In several cases, the palpebral glandular parts of these cadavers were also examined as well as palpebral lacrimal glands obtained by biopsy and parts of glands, excised because of excessive lacrimal secretion.

Cloudy swelling, hydropic degeneration, and disorganization of the secretory cells have only recently been described as affecting the lacrimal gland. The same is true for the deposit of amyloid in an irregular spotted arrangement in the wall of small blood vessels and close to the membrana propria of the acini. Recognized recently, for the first time, has also been the deposit of yellowish-brown granules of pigment in the basket-cells lying inside the membrana propria of the acini close to the epithelial secretory cells.

The entire work, although brief, presents the essentials in some 32 different pathologic conditions in an easily understandable style.

H. D. Lamb.

CORRESPONDENCE

Dr. Fuchs and the University of Liége

April 16, 1940

Editor,
American Journal of Ophthalmology,
640 S. Kingshighway,
Saint Louis, Missouri.

Dear Sir:

At the luncheon given Dr. Fuchs at the

time of the Amsterdam Congress, he spoke with reference to his early days, and gave a little different account of the incident from that given in the review of his book on page 465 of the April Journal. He said that his destination was this country, and that he had secured his passage on a ship landing at New Orleans. The sailing was cancelled on account of the presence of yellow fever in New Orleans, and before conditions made it possible for him to come, the appointment at the University of Liége was offered him. I was present at the luncheon and am sure that I am not mistaken about his account of the incident.

Very sincerely,
(Signed) E. C. Ellett.

Sulfanilamide Therapy of Trachoma

April 18, 1940

Editor,
American Journal of Ophthalmology,

My dear Sir,

In the March issue of the American Journal of Ophthalmology, Dr. W. D. Spining of Ganado, Arizona, reported unfavorably upon the use of sulfanilamide in trachoma, basing his observations upon two series of cases. The first consisted of 15 adults "with 'phlyctenules' or corneal ulcers superimposed upon trachoma of long standing" and the second of 17 children "all having chronic trachoma." Again to quote "In all of these cases, trachoma had been present for a year or more" and "various degrees of scarring of the upper palpebral conjunctiva were present." In other words, all of the cases were trachoma IIIa, IIIb, or IV. Twelve of the children were reëxamined three months after treatment had stopped, but in the remaining 20, it appears that the patients were not seen again after completion of the three-weeks' course of treatment.

I wish to protest against the condemnation of a drug upon such inconclusive evidence. This protest is based upon the experience that my colleagues in the Indian Service, in the Trachoma Clinincs of Southern Illinois, in the Illinois Eye and Ear Infirmary, and I have had with not the mere handful above reported, but with nearly 60 times that number, observed not merely a few weeks, but followed for periods of over two years.

Despite the popular concept of its magical properties, sulfanilamide cannot eliminate scar tissue and the resultant deformities of the later stage of trachoma. Only death can do that. The older the trachoma, the later become manifest the beneficial results of sulfanilamide therapy. In fact, in many instances, from three to six months are required before follicles will disappear. In trachoma I and trachoma II, the drug is 100-percent effective in the eradication of the disease, provided the patient does not develop manifestations of systemic intoxication. In trachoma III, both a and b, from 60- to 70-percent results can be obtained, depending upon the amount of scar tissue present. In trachoma IV, no results need be expected. Consequently, any discussion of the therapeutic value of sulfanilamide in the treatment of trachoma is valueless unless the cases are classified according to the stage of the disease present and unless the length of observation after conclusion of the treatment is noted.

(Signed) Harry S. Gradle.

ERRATUM

In the article on "Lens lesions in contusions" (1940, volume 23, March, page 263), the illustrations for cases 51 and 53 of table 4 are interchanged.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP
ASSISTED BY DR. GEORGE A. FILMER

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

1

GENERAL METHODS OF DIAGNOSIS

Goldmann, Hans. **Slitlamp photography and photometry.** Ophthalmologica, 1940, v. 98, Jan., p. 257.

Goldmann has succeeded in making remarkably clear slitlamp photographs of the anterior segment of the eye with a camera of his own design. Photographs of the eye illuminated by means of the slitlamp are indistinct because a clear image is possible only in the small region where the beam is in focus. If the lamp is adjusted so that the beam is sharply focused on the cornea all media behind the cornea are veiled. By moving the objective lens of the slitlamp closer to the eye, these other parts can be brought into sharp focus one after another. Goldmann's camera is so arranged that an image of the clear portion of the beam is in focus on a slit behind which a film strip is moved. As the slitlamp is moved nearer to the eye, the more posterior levels are brought into sharp focus one after another. The camera and its film strip are moved synchronously. In this way only the image of that small strip of eye tissue which is sharply illuminated at the time strikes the film strip and a continuous series of clear photographs results. The total picture of the anterior eye obtained by this maneuver is slightly distorted, but for purposes of measurement a mathematical correction can easily be made.

By an extension of the principle and the use of a measurable and controllable source of light, the method has been adapted for photometry. This may prove useful in the elucidation of delicate and minute changes in the transparency of cornea and lens, which may be significant although invisible in direct observation.

F. Herbert Haessler.

Gradle, H. S. **An aid to indirect ophthalmoscopy of the periphery of the fundus.** Amer. Jour. Ophth., 1940, v. 23, March, p. 321.

Irvine, R., and Stimson, R. L. **A method of ultra-close-up photography**

in ophthalmology. Arch. of Ophth., 1940, v. 23, Jan., pp. 161-163.

With an Exacta camera mounted on a compound base and fitted with an adjustable tube behind a 50-mm. Tessar lens a magnification of from two to five times is obtained. An adjustable stand holds two lamp housings which can be rotated to stop in a centered position at the end of the illuminating tube, one housing containing a 100-watt frosted lamp for focusing and the other a number-20 photoflash foil-filament lamp which is fired by the synchronizer built in the camera. The instrument is shown in a photograph.

J. Hewitt Judd.

Müller, H. K. **The Zeiss projection-perimeter as a hollow-sphere perimeter.** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 235.

The author finds this perimeter superior to all others for clinical use.

C. Zimmermann.

Persichetti, C. **The hemoclastic reaction in luetic patients with ocular manifestations.** Boll. d'Ocul., 1939, v. 18, March, pp. 164-178.

Tests performed on 70 ophthalmic patients aged from 11 to 76 years showed the hemoclastic reaction of D'Amato to be positive in those affected by syphilis, either congenital or contracted, while it is constantly negative in nonluetic patients. The reaction is positive also in luetic patients with negative Wassermanns, showing it to be a more reliable test than the latter. The writer concludes that the reaction can be conveniently used as a subsidiary diagnostic resource in ophthalmology. (Bibliography.)

M. Lombardo.

Terry, T. L., and Mattis, R. D. **A plastic illuminator.** Arch. of Ophth., 1940, v. 23, Jan., pp. 164-165; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1939, 90th mtg.

The instrument consists of two tips made of lucite mounted for focusing before a powerful bulb in a "penlight" handle and connected to the power supply by a detachable cord. It is small, of light weight, free from heat, and easily sterilized. The curved tip gives satisfactory transillumination of the posterior segment, and the straight tip of the anterior segment. The instrument is shown in a photograph and its optic principles in a drawing.

J. Hewitt Judd.

Traquair, H. M. **Clinical detection of early changes in the visual field.** Arch. of Ophth., 1939, v. 22, Dec., pp. 947-967; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 158.

The distinction between contraction and depression of the visual field is necessary in order to correlate the changes in the field with the underlying pathologic factors. The 1/2000 isopter is advantageous in examining the field at a level where its slope is more gradual and where a slight depression will produce a greater deflection of the isopter concerned. More importance should be attributed to alterations in the shape of the isopters than to slight alterations in their extent. Colored targets are valuable for indicating the nature rather than the presence of altered function, as in the demonstration of the partial and diffuse character of an impairment in an affected area. A small white object stimulates a minute area of the retina with a relatively bright stimulus, whereas a colored target stimulates a larger area of the retina with a less intense stimulus. Reduction of illumination is probably more important in the amplification of known or suspected defects than in their dis-

covery. Scotomas due to conditions such as retrobulbar neuritis, toxic amblyopia, or glaucoma, which may appear to have begun by extension from the blind spot, have really originated apart from the blind spot and have subsequently merged with it. Scotomas which arise as extensions of the blind spot are found in conditions such as papilledema, high myopia, and juxtapapillary choroiditis. In both groups, as in the case of the periphery of the field, it is alteration in shape rather than in size that is of importance. Examples of the early stages of slowly advancing defects are cited, showing the value of the 1/2000 isopter in their detection. (Discussion.)

J. Hewitt Judd.

Verhoeff, F. H. **Improved kinetic test for binocular stereopsis.** Amer. Jour. Ophth., 1940, v. 23, March, pp. 320-321; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 409.

2

THERAPEUTICS AND OPERATIONS

Charamis, J. S. **Vaccinotherapy of ocular syphilis by the spirochetic vaccine of Hilgermann.** Arch. d'Opht., etc., 1939-1940, v. 3, no. 9, p. 779.

Hilgermann, director of the Prussian Institute of Hygiene at Landsberg, about the year 1932 evolved a vaccine treatment for syphilis which has been used in many cases with promising success. Only 14 cases of ocular syphilis thus treated, however, have been reported. The author adds five: three of interstitial keratitis, one of oculomotor and facial paralysis, and one of choroiditis. Only the first three cases were benefited. Vaccinotherapy is valuable in slowly evolving cases and particularly as a complement to chemotherapy. (References.) Derrick Vail.

Ciotola, Guido. **Experimental investigation on the influence of ascorbic acid (vitamin C) on ocular morbid processes of anaphylactic nature.** Boll. d'Ocul., 1939, v. 18, Feb., pp. 66-71.

The antianaphylactic action of ascorbic acid was tested in guinea pigs and rabbits after provoking a parenchymatous keratitis and iridocyclitis by injecting horse serum in the cornea or anterior chamber. The results are stated as follows: If ascorbic acid is administered to the animals during the period of sensitization (between the serum injection in the first eye and the serum injection in the other eye), the subsequent course of the provoked ocular manifestation is less severe than that in the control animals. If ascorbic acid is administered only once (30 minutes before the sensitizing injection or before the serum injection in the other eye), the ascorbic-acid action is slight or absent. The same is true if vitamin C is administered soon after the ocular manifestations appear.

M. Lombardo.

Foy, Humphrey. **Radiotherapy in lesions of the eye.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 458.

As suitable for properly controlled roentgen or radium treatment, the author includes almost all of the pathologic entities. He believes that reported dangers such as corneal ulceration, secondary glaucoma, and cataract are as a rule unfounded. Experimental work on animals has shown that the eye is relatively insensitive to radiation. Beulah Cushman.

Fuhs, H., and Bück, J., **Indications and results in fever therapy of lues with special consideration of ophthalmologic applications.** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 129.

The authors discuss the development of fever treatment in lues; the principles, technique, indications, and contraindications of malaria therapy; tabetic atrophy of the optic nerve and its prophylaxis; parenchymatous keratitis; and the significance of the malaria cure in luetic ocular affections. Only those cases of optic atrophy with positive serum and spinal-fluid reactions should be submitted to malaria treatment. From ophthalmologic observations, prophylaxis of optic atrophy by an early malaria cure cannot be asserted. C. Zimmermann.

Gözcü, N. I. **Fever therapy in syphilitic ocular affections.** Türk Oft. Gazetesi, 1936, v. 2, pt. 1, p. 10. (French abstract: 1936, v. 2, pt. 3, p. 171.)

The author injected typhoid vaccine in thirty cases of ocular syphilis. In twenty cases of optic-nerve atrophy, fourteen were improved and six remained stationary; three patients with neuroretinitis were improved; four cases of chorioretinitis were improved and one remained stationary; two cases of ophthalmoplegia were completely cured. The author concludes that fever therapy instituted early gives the best results. Patients having vision of better than 0.5 easily recover normal vision, those whose vision is between 0.5 and 0.1 are materially improved; practically no improvement in vision occurs when the vision is less than 1/20. The usual antisyphilitic treatment should be continued during the series of typhoid injections, which the author prefers to malarial therapy. George H. Stine.

Grósz, Stephen de. **Local use of vitamin-A preparations in ophthalmic practice.** Arch. of Ophth., 1939, v. 22, Nov., pp. 727-734.

The local application of vitamin A in oil is especially indicated in cases of corneal injury and dystrophy since it stimulates epithelization. It is applied from three to five times a day, and can be used with or without a bandage. It may also be used in the form of an ointment to the lid. Heat in the form of short-wave or infrared irradiation should be employed to aid its resorption. In those individuals found to have low vitamin-A values in the serum local application should be combined with vitamin A orally. Ethylmorphine hydrochloride may be used as an adjunct. J. Hewitt Judd.

Hague, E. B. **A new ultraviolet lamp for cataract surgery.** Amer. Jour. Ophth., 1940, v. 23, March, pp. 317-318.

Waldman, Joseph. **A new method of applying radon seeds for ocular disorders.** Arch. of Ophth., 1940, v. 23, Jan., pp. 55-59.

An applicator made of rolled sheet silver or platinum and bent to conform to the curvature of the eyeball is applied through a small incision in Tenon's capsule directly to the sclera overlying the intraocular growth. At one end are two sets of perforations for suturing the applicator in place. At the other end are depressions made to receive the seeds, over which a sliding spring cap is fitted so as to hold the seeds in place. Roentgenograms with the applicator in place will check its position and make sure that the seed has not fallen out of the receptacle.
J. Hewitt Judd.

Woods, A. C. **Treatment of tuberculosis of the anterior portion of the eye with beta rays of radium.** Arch. of Ophth., 1939, v. 22, Nov., pp. 735-742.

The method, dosage, and results of treatment with the beta rays of radium

of ten patients with tuberculous keratoiritis and of three with deep tuberculous scleritis are reported. All patients with tuberculous keratitis showed prompt subsidence of all inflammation after one course of treatment, although two had recurrences, which were controlled by further irradiation. Deep scleritis was more resistant, steady treatment over a greater period of time being required before any decided improvement occurred. One patient with scleritis apparently recovered, one showed marked improvement, and one, probably inadequately treated, had a relapse after treatment was stopped. The causal relation of beta irradiation to the therapeutic results, the mode of action of such irradiation, and the question of permanency of results are discussed. J. Hewitt Judd.

3

PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Dascalopoulos, N. **Comments on a case of acute spasm of accommodation in an adult.** Bull. Soc. Hellénique d'Opht., 1939, v. 8, April-June, p. 187.

The author distinguishes accommodative hyperactivity, occurring insidiously in hypermetropic children, from true spasm of accommodation in adults, coming on suddenly and impairing the visual acuity. In such a case which followed prontosil injections and an emotional upset, pilocarpine caused an exaggeration of the spasm while atropine returned the refraction to the emmetropic state. George A. Filmer.

Di Bari, Enzo. **The tolerance to lens-axis inclination in near vision.** Boll. d'Ocul., 1939, March, pp. 193-200.

The author finds that, with an average inclusion of the lenses of 10 degrees in relation to the frontal plane, there is a tolerance of about 10 degrees as regards the angle of vision through the lens. M. Lombardo.

Di Bari, Enzo. **Tolerances in determination of the axis of a cylinder in correction of astigmatism.** Boll. d'Ocul., 1939, v. 18, Feb., pp. 72-83.

The tolerance to a misplacement of the axis of a cylinder depends on physical factors (refraction of the eye, diameter of the pupil, strength of the lens) and the physiologic factors (thickness of the cones). The tolerance is highest in the section containing the axis and minimal in the intermediate section. M. Lombardo.

Di Bari, Enzo. **Tolerances in determination of the distance of the lens from the eye in correction of ametropias.** Boll. d'Ocul., 1939, v. 18, Jan., pp. 19-22.

On an optico-physiologic basis the writer determines these tolerances in spheric and astigmatic corrections.
M. Lombardo.

Eber, C. T. **Simultaneous color contrast.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 447-449.

Györffy, István. **Contact shells made of plastics.** Klin. M. f. Augenh., 1940, v. 104, Jan., p. 81.

Shells made of an unbreakable clear transparent resin (methylacrylacid ester) have proved best. They do not irritate the eye, are optically satisfactory, can be shaped at a comparatively low temperature, are more easily made, are lighter than glass, and are elastic to a certain degree.
C. Zimmermann.

Lindner, K. **New thoughts on the etiology of myopia.** Klin. M. f. Augenh., 1939, v. 103, Dec., p. 582.

Lindner contradicts the fatalistic doctrine of heredity in the development of myopia, put forward by Steiger and his successors. In his opinion school myopia is no unavoidable fate, and by exact correction of optic deficiencies, moderation of near work, and other relieving measures, the progress of school myopia may be inhibited. School myopia is brought about by near work. Myopia, especially of high degree, may also arise without near work and must be ascribed to a congenital, probably hereditary, disposition. Myopia may develop in only one eye, or to different degrees in both. Myopia may also occur after serious general diseases. After mentioning these facts, the author attributes the stretching of the sclera at the posterior pole to damage to the capillaries of the choroid by toxins or lack of oxygen supply. Subsequent accumulation of vitiated tissue fluid and extravasation of blood plasma in consequence of carbonic-acid increase produce a softening of the sclera, so that the latter more easily yields to the normal intraocular pressure. This is favored by too great demand on the eye by reading. C. Zimmermann.

Miller, Hugh. **Is myopia a deficiency disease?** Amer. Jour. Ophth., 1940, v. 23, March, pp. 296-305.

Ogle, K. N. **Relative sizes of ocular images of the two eyes in asymmetric convergence.** Arch. of Ophth., 1939, v. 22, Dec., pp. 1046-1067.

Differences in size between retinal images of the eyes may arise in asymmetric convergence because the object fixated is at a different distance from the two eyes. The magnitude of the difference increases with the nearness of the object and with the degree of lateral turning of the eyes. The studies reported here confirm, in general, the results previously recorded by Herzau and Ogle (Amer. Jour. Ophth., 1937, v. 20, p. 1272) which indicated that some type of change in the relative size of the images occurs which offsets or tends to offset the difference in distance from the object to the eyes in asymmetric convergence. This apparent change was of the amount necessary to compensate for the difference in the size of the retinal images that would exist because of the difference in the distance of an object from the two eyes for all visual distances from 5 meters to 20 cm. No change could be measured with the eyes adjusted for distant vision. The compensatory change was found principally in the vertical meridian, though it occurred for some observers in the horizontal meridian. The phenomenon apparently takes place in the act of turning the eyes to an asymmetric convergence position. The results also differed depending on whether ocular movements were involved in the measurements, those obtained by judgments of contours peripherally seen showing much less change in the size of the images. Afterimage tests proved unsatisfactory. No attempt was made to determine the causal factors which could be responsible for such a phenomenon, though three possibilities were suggested: an actual change in the size of the retinal images from dioptric changes, a change brought to bear on the retinal membrane, and a psychologic reinterpretation, all dependent on some sensory influence of the eyes themselves when turned in asymmetric convergence. J. Hewitt Judd.

Prangen, A. de H. **The myopia problem.** Arch. of Ophth., 1939, v. 22, Dec., pp. 1083-1096.

The theories of the etiology of myopia are reviewed and data presented to

show that the frequency distribution of myopia can be accounted for from a biologic point of view rather than by a mechanical theory. Myopia is a biologic tendency to reduce the hyperopic reserve usually seen in childhood. This process may become arrested at any stage or continue unchecked, and myopia is the result and not the cause of this process. Children who have a low hyperopia should be watched as they may have an inadequate hyperopic reserve which is essential as a protection against the development of myopia. A hereditary tendency is the chief etiologic factor, and while the importance of all other factors is debatable, excessive convergence must be considered. Treatment consists of full correction constantly worn, periodic examinations, general hygienic and dietetic measures, and the restriction of unnecessary near work. Instillation of epinephrine is of doubtful value, but worth trying. Progressive myopia of the malignant type is rare and is an independent biologic variation. J. Hewitt Judd.

Roaf, H. E. **The recognition of color.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 395.

Defective color vision is usually due to decreased differentiation between "red" and "green." So-called colorless stimuli always produce composite effects. Each eye can produce in the cortex its own pattern of the external world, and differences are the result of interference either with the method of stimulation (photochemical) or in the layers of the retina. The outstanding peculiarity is that the longer wavelengths of radiation raise the threshold to all lights, while the shorter wavelengths act mainly on the threshold for their own radiations.

Beulah Cushman.

Spadavecchia, Vitangelo. **Introductory considerations concerning the optico-physio-psychologic functions of vision, with especial regard to the psychic component.** Ann. di Ottal., 1939, v. 67, Nov., p. 801.

The purport of this lengthy article is that the act of vision, direct and indirect, immediate and mediate, demands for its understanding a full recognition of the psychic element involved. Park Lewis.

Van Wien, Stefan. **The Leland refractor; a method for refraction under binocular conditions.** Arch. of Ophth., 1940, v. 23, Jan., pp. 104-111.

The instrument which by the use of polarized light enables one to conduct a refraction under binocular conditions is described and the procedure is outlined. The advantages claimed are a sensitive test for the axis and amount of astigmatism and for the balancing of the spherical correction as well as adjustment of the axes of the cylinders in binocular vision. In cases of muscular imbalance the instrument indicates the spherical changes required or, if prisms are indicated, the proper amount. J. Hewitt Judd.

4

OCULAR MOVEMENTS

Berens, C. **A prism bar of thermoplastic material for measuring high degrees of squint.** Trans. Amer. Ophth. Soc., 1939, v. 37, p. 404.

Prisms from 1 to 50 prism-diopters are pressed into a single unit bar, lighter than glass, less easily broken, and more easily handled. David O. Harrington.

Black, George. **Case of convergent squint following use of atropine corrected by operation a month after on-**

set. Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 425.

A female patient 16 years of age had atropine instilled in the left eye once or twice for a trifling condition. Following this treatment a convergent squint of the left eye developed with diplopia. Correction of a moderate degree of hypermetropia of equal amount in each eye did not appreciably affect the squint. She was found to have normal fusion and stereoscopic sense with a strong esophoric tendency. Advancement of the external rectus with recession of the internal rectus was performed a month after onset of the squint. When the bandages were removed the eyes were straight with normal binocular vision and no diplopia. Beulah Cushman.

Davis, W. T. **Ocular motor anomalies.** West Virginia Med. Jour., 1939, v. 35, Nov., p. 500.

This is a discussion of the author's treatment of phorias, paralytic squint, and convergent and divergent squint. The method of treatment of accommodative convergent squint is of special interest. Amblyopia is corrected first, either by total or transparent lens occlusion. Then the patient is taught to keep the eyes straight even though the vision be blurred. Hyperopes of plus 4.00 D. or less are instructed to go without their glasses for distance. Gradually the patients learn to maintain their eyes straight and to obtain clear distant vision. As the habit of keeping the eyes straight becomes strongly developed, hyperopes of plus 2.50 D. or less can go without glasses for near work. In cases of convergence excess requiring surgery, the author prefers the Jameson recession of one medial rectus. Should this prove insufficient, the opposite medial rectus is recessed. Should the squint still persist, a shortening operation is done on one of the lateral recti. John C. Long.

Duhamel, E. **By choice, at what age should one operate for strabismus.** Bull. Soc. d'Opht. de Paris, 1938, June, p. 352.

The contradictory opinions of oculists concerning the optimum age for operating on strabismus are noted by the author. Some believe that an early operation favors the attainment of binocular single vision and the avoidance of amblyopia ex anopsia, while others stress the undeniable fact that many cases of convergent strabismus straighten with age. The author sums up his own experience and opinions as follows: If the operation is for purely cosmetic purposes it should be postponed until after the onset of puberty. If the purpose of the operation be functional the indication for operation will depend upon the visual acuity of the deviating eye. If an amblyopia ex anopsia grows worse in spite of the usual orthoptic treatment it is better to operate without delay. In all other cases in which the visual acuity of the deviating eye is sufficient to permit binocular vision operation should be postponed until after puberty. (35 references.) Jerome B. Thomas.

Faulkner, S. H. **Familial ptosis with ophthalmoplegia externa starting in adult life.** Brit. Med. Jour., 1939, Oct. 28, p. 854. (See Section 14, Eyelids and lacrimal apparatus.)

Jayle, G. E. **Paralyses of supranuclear origin.** Bull. Soc. d'Opht. de Paris, 1938, March, p. 144.

The author points out the difficulties in classifying these types of motor anomalies, and makes note of the dis-

parities of opinion between ophthalmologists and neurologists. He distinguishes simple paralyses and secondary contractures, and discusses his own method of classification.

George A. Filmer.

Lancaster, W. B. **Detecting, measuring, plotting, and interpreting ocular deviations.** Arch. of Ophth., 1939, v. 22, Nov., pp. 867-880; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1939, 90th mtg.

A method is presented for measuring quickly and accurately the position of the covered eye when the other eye is fixating, whether in the primary position or in any of the cardinal positions. Two lights are thrown on the screen, red for the right eye and green for the left eye. They are so placed that their images fall on the foveas of the respective eyes and so are superimposed in the mind of the patient. The lights are seen as one. One light is thrown on the screen by the examiner at any point desired for fixation. The patient shows the position of his other eye by projecting the light seen by that eye so that to him it is superimposed on the first light. Its position on the tangent screen shows what the deviation is. An easy method of recording the findings is described and charts of various conditions are included in the article. The projectors may also be used for mapping fields, especially central scotomas.

J. Hewitt Judd.

Law, F. W., Lyle, T. K., Mayou, S., and others. **Discussion on orthoptic training.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 521.

Law states that the duties of an orthoptist include work which the ophthalmic surgeon is disinclined or too busy to do. He believes that the science of orthoptics is still in the research stage, and strongly condemns its indiscriminate use by medically unqualified persons. He is of the opinion that most claims of beneficial results are exaggerated, and that only a limited number of definite conditions are helped.

Lyle gives a historical review of the use of orthoptics. The author defines orthoptics as a name given to that branch of ophthalmology which deals with the correction of squint, and other abnormalities of binocular functions, by means of special exercises designed to produce comfortable binocular vision. He reports that in cases of accommodative convergent strabismus satisfactory results were obtained in 70 percent, but in monocular convergent cases only 6 to 10 per cent were cured. In cases of divergent strabismus with normal retinal correspondence 50 percent were cured. The main pitfall in orthoptic treatment is said to be the lack of ability on the part of the "trainer" to diagnose the presence of an abnormal retinal correspondence and to find out that the patient is unable to fuse. In cases of convergence weakness with ocular symptoms, orthoptic treatment is unrivaled and one can almost guarantee a cure after a short course of treatment.

Mayou presents the results of 55 cases of esophoria treated by orthoptic exercises. In 64 percent the symptoms were entirely and in 22 percent partly relieved, while in 14 percent there was no improvement. A method is described for teaching the patient to continue his treatment at home.

Beulah Cushman.

Lyle, T. K., on orthoptic training, see under Law, F. W.

McIntyre, A. K. **The quick component of nystagmus.** Jour. of Physiology, 1939, v. 97, Nov. 14, p. 8.

Observations made during experiments on cats showed among other facts that after cutting the third, fourth, and sixth nerves on both sides and extirpating the retractor bulbi muscles, labyrinthine stimulation still produced in the central stump of the sixth nerve motor impulses characteristic of normal nystagmus. Further, these experiments corroborate de Kleijn's contention that the rhythm of normal nystagmus is entirely central in origin and is independent of impulses from the ocular muscles. F. M. Crage.

McRae, Alex. **Paralysis of divergence.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 433.

The author presents a report of two cases of paralysis of divergence, one of which followed a mild attack of what was probably diphtheria as there was an associated paresis of the soft palate. The syndrome as presented by Parinaud and also by Duane in 1883 was found in the first but might be questioned in the second case. The characteristics are: sudden onset of homonymous diplopia and convergent squint without limitation of movement of the individual eyes; diplopia for all objects beyond a certain distance, the interval between the two objects increasing with the distance and when looking down, and decreasing when looking up; separation of images the same when looking to right or left but farther apart when looking straight ahead; single vision when the object is brought toward the eyes. These findings are interpreted as indicating the existence of a center for divergence.
Beulah Cushman.

Mayou, Sheila, on orthoptic training, see under Law, F. W.

Onfray, René. **Isolated voluntary movements of an amblyopic strabismic eye.** Bull. Soc. d'Opht. de Paris, 1938, March, p. 118.

A case report of a young girl with convergent strabismus and amblyopia. When attempting to binocularly fix an object the amblyopic eye developed a marked voluntary nystagmus.
George A. Filmer.

Semadeni, B. **Two family trees with hereditary nystagmus.** Schweiz. med. Woch., 1939, v. 69, no. 44, p. 1077.

Case histories and genetic charts are given of two families both of whose members had horizontal nystagmus.
Theodore M. Shapira.

Smukler, M. E. **Registering deviometer, an instrument to measure the degree of squint.** Arch. of Ophth., 1939, v. 22, Nov., pp. 881-882.

This instrument is made of dental rubber with the inner surface shaped to conform to the face below the margin of the lower eyelid and the side of the nose. The outer surface is flat, having on it a millimeter-scale bar with two sliding dials which can be moved laterally and fixed by a thumbscrew. The outer dial is adjusted directly over the outer limbus with the eye fixing, and the other dial is set with the eye squinting. The deviation is the distance between the dials as noted on the millimeter scale, 1 mm. equalling 4.5 degrees of squint. J. Hewitt Judd.

Travers, T. a'B. **The origin of abnormal retinal correspondence.** Brit. Jour. Ophth., 1940, v. 24, Feb., pp. 58-64.

The findings presented in this paper are based on a previous report (Amer.

Jour. Ophth., 1939, v. 22, p. 212). The two types of suppression in concomitant squint are presented. It is demonstrated that the suppression scotomata associated with abnormal correspondence alter as the retinal correspondence alters. (Figures, bibliography.)

D. F. Harbridge.

Verhoeff, F. H. **Hyperphoria tests based on a new principle.** Arch. of Ophth., 1939, v. 22, Nov., pp. 743-760; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 335.

The author points out that tests commonly assumed to measure heterophoria do not necessarily measure tendencies of the eyes to deviate with respect to each other during binocular fixation, but measure the actual deviation which exists during the absence of binocular fixation. For this he suggests the term "presumptive heterophoria." A distinction is made between horizontal and vertical binocular fixation, and it is pointed out that presumptive hyperphoria, if determined by presenting stimuli to horizontal binocular fixation while excluding stimuli to vertical binocular fixation, will closely correspond to the real hyperphoria. The author describes his apparatus and methods for measuring the presumptive hyperphoria. One of the targets employed incidentally provides a means of measuring stereopsis and also a possible means of determining noncompensated vertical aniseikonia. (Discussion.)

J. Hewitt Judd.

Weckert, Fritz. **Fusion.** Graefe's Arch., 1939, v. 140, pt. 3, pp. 553-560.

The author discusses the meaning of fusion and its importance in the development of strabismus. Failure in the fusion sense may give rise to an ocular muscle imbalance regardless of the degree of refractive error. In the treatment of strabismus, it is important to bear in mind the conception of binocular vision as a cerebral function.

Charles A. Perera.

5

CONJUNCTIVA

Burr, W. S. **Pemphigus.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 479.

A man 49 years of age had marked symblepharon with corneal ulcer in each eye. Diagnosis of pemphigus was made later and general treatment with arsenic retarded the process. Radon seeds were buried under the conjunctiva for twenty minutes; improvement resulted and a second application was made for thirty minutes. A contact glass was fitted and after eight months there had been no further deterioration; the adhesions in the left eye remained almost entirely free as a result of the mechanical effect of the contact lens.

Beulah Cushman.

Grancini, Enrico. **Oculoglandular syndrome (Parinaud's conjunctivitis) due to "Bacterium pseudotuberculosis rodentium (Pfeiffer)."** Boll. d'Ocul., 1939, v. 18, March, pp. 133-163.

A boy 16 years old was struck in the left eye by a small fly. A few days later he developed a high temperature which lasted about a week. Swelling of the left lids and of the auricular and submaxillary glands followed. Histologic and bacteriologic examination of the eye showed the presence of the Pfeiffer bacillus. Because different microorganisms may give rise to the same clinical entity, the writer proposes that in each instance the name of the syndrome shall be followed by the name of the causative organism. (Bibliography, 4 figures.)

M. Lombardo.

Machado de Sousa, O. **Histologic observations on vitally stained human conjunctiva.** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 174.

In 17 persons varying in age from 10 to 65 years, different regions of normal, slightly infiltrated, and pathologic conjunctivae were injected with not more than 0.10 c.c. of a 1-percent solution of trypan blue. Biopsies taken 3 to 60 days after the injection are described in detail. C. Zimmermann.

Sie-Boen-Lian. **Sulphanilamide treatment of trachoma.** Ophthalmologica, 1939, v. 98, Dec., p. 208.

The author reports his experience with one hundred trachoma patients treated with sulphanilamide during two years. The drug was effective in reducing secretion and diffuse thickening. Papillary thickening was influenced but slightly, the granules not at all. The corneal complications (pannus, keratitis, corneal ulcer) responded best of all. Recurrences of complications were rare. F. Herbert Haessler.

Szinegh, Béla. **Contributions to the chemotherapy of trachoma.** Ophthalmologica, 1940, v. 98, Jan., p. 321. (See Amer. Jour. Ophth., 1940, v. 23, May, p. 584.)

Tita, Carlo. **Palpebroconjunctival tuberculosis.** Ann. di Ottal., 1939, v. 67, Nov., p. 871. (See Section 14, Eyelids and lacrimal apparatus.)

6

CORNEA AND SCLERA

Aliquò-Mazzei, Alessandro. **Disciform keratitis from vaccine virus.** Boll. d'Ocul., 1939, v. 18, March, pp. 179-192.

At the time four children were successfully vaccinated against smallpox, one parent in each case (the mother in three and the father in the other) became affected with pustular lesions on the face and ulcerative complications of the cornea, which showed the characteristics of disciform keratitis. The ulcers were accompanied by either a slight iritic reaction or by a turbid aqueous with deposits on the posterior surface of the cornea, a slight or complete hypesthesia of the cornea, and preauricular, submaxillary, or cervical glandular swelling. The course was more or less protracted with resulting normal vision in one case and 5/10 of normal in the others. (Bibliography.)
M. Lombardo.

Black, George. **Case of recent corneal graft.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 412.

A corneal graft was placed following a severe keratoiridocyclitis and vision improved from hand movements to counting fingers at 6 inches.
Beulah Cushman.

Bürki, E. **Macular corneal dystrophy.** Ophthalmologica, 1940, v. 98, Jan., p. 311.

The author abstracts Bückler's description and classification of the three hereditary corneal dystrophies (granular, macular, and reticulate). He gives a new family tree which confirms Bückler's statement that the macular form is inherited recessively. Other stigmata of degeneration were recorded in this family, but there was no evidence of transition to other forms of corneal dystrophy. F. Herbert Haessler.

Burr, W. S. **Keratoconus: results of different types of operations.** Trans. Ophth. Soc. United Kingdom, 1939. v. 59, pt. 1, p. 480.

A woman aged 29 years, with bilateral keratoconus, had right vision

6/12, and left, counting fingers only. The cautery was applied to both eyes and a central Graefe-knife puncture was made. Several years later a horizontal ellipse of the right cornea was removed and two stitches were inserted through the entire thickness of the cornea. Finally the right vision with correction was 6/24 and the left 6/9.

Beulah Cushman.

Davis, W. H. **Keratoconus fitted with contact lens.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 478.

In a young woman with keratoconus of the right eye, vision was improved from hand movements to 6/6 with a contact-glass correction. The mother, who had bilateral keratoconus with vision of hand movements, had had a cauterization operation performed on each cornea forty years previously.

Beulah Cushman.

Grandi, G. **A case of disciform keratitis successfully treated with vitamin B_1.** Boll. d'Ocul., 1939, v. 18, March, pp. 208-210.

A boy of 12 years showed a deep, roundish infiltration of the right cornea, 4 to 5 mm. in diameter, and occupying the prepupillary area with no loss of the corresponding epithelium. By biomicroscopy the spot appeared to be formed of very minute dots, while the cornea was slightly insensitive. In addition to the local treatment, injections were given of betabion (a proprietary name for vitamin B_1, the antineuritic part of the vitamin-B complex). The sensitivity of the cornea was restored and the corneal infiltration absorbed to such a degree as to leave only a thin corneal opacity of 2-mm. diameter in the deep layers of the corneal stroma. Vision improved to 6/10.

M. Lombardo.

Lloyd, R. I. **A family with lattice dystrophy of the cornea.** Trans. Amer. Ophth. Soc., 1939, v. 37, pp. 120-124.

The three types of hereditary corneal dystrophy are described and the literature briefly reviewed. Several cases of atypical lattice dystrophy occurring in the same family are described in detail. (Illustrations.) David O. Harrington.

MacDonald, A. E. **Fovell eye shield for insensitive cornea.** Trans. Amer. Ophth. Soc., 1939, v. 37, p. 405.

A transparent shield of medium-weight cellophane may be attached to any spectacle frame, giving adequate protection to insensitive corneas in conditions such as exophthalmos, herpes, gasserian-ganglion section, and lagophthalmos. David O. Harrington.

McKinney, J. W. **Corneal transplantation.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 371-387.

Pascheff, C. **New histologic proofs of occurrence of pannus follicularis.** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 195.

In former essays the author has proved histologically that trachomatous pannus is neither a superficial vascular keratitis nor a simple corneal complication of trachoma, but a true trachoma of the cornea in which the same kind of follicles develop as in trachoma of the conjunctiva; he has called this "follicular pannus." Now he presents new photomicrographs which serve as proof of trachoma of the cornea. They throw new light on the character of trachoma by showing that it is not an ordinary exudative process, but a lymphatic reticulo-endothelial hyperplasia with germ centers which may even form on the cornea. If the

follicles grow and coalesce they may produce a tumor-like thickening, for which the term "pannus folliculomatosis" is proposed. The best treatment is excision and transplantation of oral mucous membrane or palpebral skin. In some cases relapses occur and follicles form in the transplant.

C. Zimmermann.

Schmidt, Rolf. **Superficial herpetic keratitis in the form of streaks and intermittent ophthalmomalacia.** Klin. M. f. Augenh., 1940, v. 109, Feb., p. 213.

Supplementing his previous description of four cases (Amer. Jour. Ophth., 1933, v. 16, p. 933) the author describes some new cases of undoubted herpetic origin, two following superficial injury of the cornea, one after a cold, and two after cataract operation. The condition lasted from six days to four weeks. Scraped corneal material was inoculated into corneas of rabbits with success in two cases. The two negative results had no significance, as the clinical picture and the course of the disease decidedly indicated a herpetic etiology of the corneal streaks. In a man of 63 years the streaks were observed under the epithelium and consisted of very fine opacities. Decreased sensitivity of the cornea and hypotony of the eyeball (less than 10 mm. Hg) were striking features. C. Zimmermann.

Sledge, S. K. **Blue sclerotics.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 413.

The family described consisted of a father with blue sclerotics, one son with blue sclerotics and otosclerosis, and another son with blue sclerotics and fragilitas ossium. Two sons were unaffected. Beulah Cushman.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Duthie, O. M. **Sympathetic disease: treatment by tuberculin.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 414.

Six weeks after a perforating wound at the corneoscleral margin, in treatment of which the prolapsed iris and ciliary body had been removed and a conjunctival flap made, the eye became softened and precipitates formed. The eye was enucleated immediately. Forty-eight hours later the other eye showed a plastic iritis. All tests were negative except the Mantoux, which was positive to human and bovine tuberculosis. For eight months bovine tuberculin was given regularly, and with great care because of the hypersensitivity of the patient. Three months after treatment was begun the eye had become quiet, the precipitates had almost disappeared, the vitreous was only slightly hazy, and corrected vision was 6/6.

Beulah Cushman.

Hawker, G. P. D. **Relapsing iritis treated by X radiation.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 474.

A man of 35 years had had frequent attacks of iritis for five years. No foci could be found although he was a hunchback. In conjunction with local therapy X-ray treatment twice a week was instituted. The iritis cleared rapidly and within two months the vision had improved from 6/36 to 6/6 with media clear but some remaining synechiae. Beulah Cushman.

Jayle, G. E., and Derrien, Y. I. **An attempt to extend Derrien's law to the blood-fluid equilibriums of the eyeball.**

Bull. Soc. d'Opht. de Paris, 1938, March, p. 139.

The authors found that for the normal aqueous humor the ratio of values between blood and aqueous for glucose was less than one, and for sodium chloride greater than one. In the secondarily new-formed aqueous, however, the ratio of values for both substances approached unity. They conclude that Derrien's law applies, and that the capillary wall plays an active part in the equilibrium.

George A. Filmer.

Lewis, F. P. **Two rare cases of congenital anomalies of the eye with clinical implication.** Trans. Amer. Ophth. Soc., 1939, v. 37, pp. 358-367. (See Section 13, Eyeball and orbit.)

Mandach, F. **Treatment of sympathetic ophthalmia with atophanil and cyclotropin.** Schweiz. med. Woch., 1939, v. 69, no. 44, p. 1079.

The author adds to the literature another case in which the above drugs were helpful. Theodore M. Shapira.

Robertson, J. **The aqueous humor: a secretion.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 611. (See Amer. Jour. Ophth., 1939, v. 22, July, p. 791.)

Tzanck, A., Weissmann-Netter, and Levi, M. S. **Unilateral reaction in the cornea and iris appearing in a syphilitic patient during arsenical treatment.** Bull. Soc. d'Opht. de Paris, 1938, March, p. 114.

In a case of primary syphilis being treated by intravenous novarsenobenzol, a deep keratitis and iritis appeared on the third day. Possibilities as to the inciting cause of the ocular condition are discussed.

George A. Filmer.

8

GLAUCOMA AND OCULAR TENSION

Bollack, J., Voisin, J., and Camps, S. **A peculiar form of infantile glaucoma; malformation of the iridocorneal angle with functional integrity.** Bull. Soc. d'Opht. de Paris, 1938, March, p. 127.

A 12-year-old child presented a megalocornea and numerous trabeculae in the angle of the anterior chamber. Ocular tension was increased and had remained elevated in spite of miotics. Although the condition gave the appearance of infantile glaucoma, the visual acuity had remained good and there had been no loss of visual field. Other positive findings were a mild hydrocephalus and congenital syphilis.

George A. Filmer.

Constantine, E. F. **A study of the interrelationship of retinal and systemic arterial pressures and intraocular tension in normal and syphilitic patients.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 436-445.

Luedde, W. H. **Relation of capillary and corneal osmosis to glaucoma therapy.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 388-401.

Mees, Günter. **The influence of retrobulbar anesthesia on intraocular tension.** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 223.

Tonometric measurements on 133 cataractous eyes at intervals of one to ten minutes after retrobulbar injections of from 0.75 to 1 c.c. of a 2-percent solution of novocaine with epinephrine revealed a diminution of tension greatest within one minute, but no diminution after the sixth minute. Measurements on the uninjected second eye showed far less diminution. The essential practical value of this artificially produced hy-

potony for cataract operation is in the prevention of vitreous prolapse (especially in the intracapsular method), and in lessening the chance of intraocular hemorrhage. The same results were observed on 34 eyes with glaucoma simplex and 10 eyes of hemorrhagic glaucoma. Experimentally the hypotony was obtained after retrobulbar injections in rabbit eyes.

C. Zimmermann.

Miles, W. R. **Experimental modification of the polarity potential of the human eye.** Yale Jour. Biol. and Med., 1939, v. 12, Dec., p. 161.

Studies of eye potentials were recorded showing the effects of pressure on the eye, massage of the eyeball over the closed eyelid, and the instillation of hypertonic salt solution. The potential was found to agree with changes in blood pressure, metabolism, and other functions which decrease with relaxation and inactivity when the subject is comfortable and free from apprehension. General psychologic and physiologic conditions specifically influence the measured value of the potential.

F. M. Crage.

9

CRYSTALLINE LENS

Bangerter, A. **Cataract in endemic sprue.** Ophthalmologica, 1940, v. 98, Jan., p. 291.

Two cases of endemic sprue are described in patients who developed lenticular opacities which rapidly progressed to total intumescent cataract. Both patients had gastroenteritis with disturbance of absorption of dextrose, fat, and calcium. They also had secondary tetany and secondary anemia. The author discusses the relationship between cataract, the disturbances in metabolism, and the activity of hormones and vitamins.

F. Herbert Haessler.

Borsotti, Ippolito. **Three and a half years of lens-antigen therapy. Clinical experiment.** Ann. di Ottal., 1939, v. 67, Nov., p. 855.

The author has been occupied during the past 3½ years in experiments on the problem of lens-antigen therapy. In those cases of cataract extraction in which residual lens matter remained unabsorbed in the anterior chamber he injected in the gluteal muscles an emulsion of human cataractous material or of the lens of the ox. Of 300 cases operated upon, 34 presented this condition and antigen treatment was applied. In 15 of these cases the injection appeared to have no influence on the resorption of the mass. In the other 19 cases it might be said that there was a more active resorption of the remaining cortex after the injection but it was difficult to determine whether the absorption might not have gone on equally well without the aid of the injected emulsion. These experimental researches led the author to the conclusion that in those cases in which the retention of residual lens matter was accompanied by iritic reaction, the injection showed a favorable influence in reducing the inflammation rapidly. In no case was there an unfavorable reaction. (Bibliography.) Park Lewis.

Kraupa, Ernst. **Transitory amblyopia.** Ophthalmologica, 1940, v. 98, Jan., p. 300.

It is not likely that the transitory amblyopia observed after cataract extraction can be frequently explained as amblyopia ex anopsia. Kraupa believes that this amblyopia is the result of a transitory tissue damage of the fovea

due to stasis in the perifoveal capillaries. The damage may result in a simple edema, barely visible clinically, diapedesis of red blood-cells, or even necrosis. The circulatory disturbance of the macula is caused by the incision for cataract extraction, or is occasionally seen after blunt trauma, arising through the vasomotor nerves.

F. Herbert Haessler.

Pinkhof, J. **Ectopic zonula.** Ophthalmologica, 1939, v. 98, Nov., p. 149.

The author presents a histologic study of an eye removed from a young child because of secondary buphthalmos. The lens had been opaque but became absorbed. There were displacements of the ciliary processes and membranes, and fibers with the properties of zonular fibers had become inserted on the lens residue at the level of the lower pupillary border.

F. Herbert Haessler.

Saint-Martin, R. de. **Clinical details in a case of Marfan's syndrome.** Ophthalmologica, 1939, v. 98, Dec., p. 201.

In a 28-year-old female whose clinical picture of Marfan's syndrome was incomplete, both lenses luxated into the anterior chamber and vitreous. The one that was extracted was strikingly small and had zonular changes. One iris had peripupillary atrophy which might be attributed to aplasia as described by Weill or to glaucoma secondary to luxation of the lens. The basal metabolism which was normal after fasting and subnormal after protein ingestion suggested a pituitary defect, confirmed by the presence of scoliosis, dysmenorrhea, and skeletal changes.

F. Herbert Haessler.

Von der Heydt, Robert. **Familial progressive juvenile cataracts (parathyroid deficiency).** Amer. Jour. Ophth., 1940, v. 23, April, pp. 434-436; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 116.

Weekers, Roger. **Carbohydrate metabolism of the lens. Transparency of the isolated lens in the presence of glucose, levulose, and galactose.** Ophthalmologica, 1939, v. 98, Nov., p. 142.

The isolated lenses of adult rabbits perfused with Ringer's solution or glucose-free Tyrode solution lose their transparency on the second or third day after removal. The addition of glucose keeps them clear decidedly longer but neither levulose nor galactose can be substituted for it. In no case did the lenses stay clear as long as those which Bakker kept in abdominal transudates.

F. Herbert Haessler.

10

RETINA AND VITREOUS

Arkle, J. S. **Retinal artery thrombosis treated by heparin.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 422.

Two cases of retinal-artery thrombosis were treated with 5-percent heparin. Doses of 2 c.c. were given intravenously every four hours for 48 hours. The vision of both patients was decidedly improved.

Beulah Cushman.

Avižonis, V. **Retinal capillaropathy.** Ophthalmologica, 1939, v. 98, Nov., p. 129.

The author discusses the ophthalmoscopic condition commonly known as Gunn's dots, which consist of yellowish and white punctate opacities in the retina in the region of the posterior pole. He lists the retinal lesions characterized by this phenomenon and critically discusses them. The lesions

are areas of softening in the retina caused by disturbance of capillary circulation, and in the opinion of the author may be most aptly named "retinal capillaropathy." Spastic phenomena in the capillaries and precapillaries are the usual cause although the dots may be observed in circulatory disturbances produced by glaucoma simplex. In treatment, vasodilators are indicated. In the early stages treatment is highly successful. An extension of the process may lead to retinitis circinata, and similar changes in the choriocapillaris may produce senile disciform degeneration of the macula.

F. Herbert Haessler.

Benedict, W. L. **Report of operations for detachment of the retina at the Mayo Clinic.** Surg., Gynec., and Obstet., 1940, v. 70, Feb. 15, p. 466. (Symposium paper; see also Berens, Ellett, Meyer, Post.)

This paper discusses interesting points in technique and prognosis. The author claims that the operative time has now been reduced to 20 or 30 minutes. The important time-saving points are: (1) general anesthesia by pentothal sodium intravenously; (2) muscles retracted by hooks instead of being divided; (3) rents or holes previously accurately localized; (4) single needle employed, Gradle's being preferred; (5) subretinal fluid drained after fulguration is complete, an electrically driven trephine being used to make a 1-mm. opening through the sclera in the dependent portion of the area of detachment. When the retina shows evidence of reattachment, the patients are kept in bed with eyes bandaged for from 25 to 30 days; and pinhole goggles are worn another thirty days. Benedict has classified operations as successful on the basis of visual acuity, visual field, and restoration of retina to normal position. With the fulguration method, 49 percent of the operations were successful. What percentage showed actual improvement is not stated.

Ralph W. Danielson.

Berens, C., Hall, D. S., Smith, B., and McAlpine, P. T. **Late results of operations for separation of the retina.** Surg., Gynec., and Obstet., 1940, v. 70, Feb. 15, p. 454. (Symposium paper; see also Benedict, Ellett, Meyer, Post.)

This article reports surgery on 230 eyes. The operative and postoperative complications are reviewed. Among the 230 eyes 21 postoperative cataracts developed. After nine months postoperative interval, vision was improved in 21 percent of the cases, and the field of vision in 16 percent. In only 24 cases were vision and visual fields improved. The results in aphakic cases were better than usually reported in that out of 14 cases two had complete reattachment and three had partial reattachment. Twenty-six out of the 230 eyes obtained vision of 20/70 or better. The amount of visual recovery depends not upon the extent of reattachment but upon the extent of degenerative changes in the retina. Most of the operations were by multiple diathermy. (18 statistical tables, 31 references.)

Ralph W. Danielson.

Bruhn, A. M. **Contribution to the genesis of traumatic retinal angiopathy (Purtscher).** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 152.

After a fall from his plane into water, an aviator showed changes of the fundus of the right eye typical of traumatic retinal angiopathy. These changes included edema of the macula, striate hemorrhages near the veins which were congested, central scotoma, and vision

reduced to 1/10. Despite subsequent pigment-scattering at the macula, vision became normal. The affection was attributed to a direct extravasation of serum from the veins due to sudden stasis of the blood by compression of the thorax. This was possible because of the lack of valves in the veins of the upper half of the body.

C. Zimmermann.

Constantine, E. F. **A study of the interrelationship of retinal and systemic arterial pressures and intraocular tension in normal and syphilitic patients.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 436-445.

Courcy, T. L. de, and Gillis, L. **Night blindness treated by vitamin A.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 442.

The authors present the history of a patient whose light-adaptation time (interval within which central after-image produced with the apparatus disappears) as measured with the biophotometer was 85 seconds. Improvement occurred after four vitamin-A capsules (10,000 units) were given per day, but a normal adaptation of 20 seconds was not attained until 15,000 units were given daily.

Beulah Cushman.

Ellett, E. C. **Results of operations for detachment of the retina at the Memphis Eye, Ear, Nose and Throat Hospital.** Surg., Gynec., and Obstet., 1940, v. 70, Feb. 15, p. 471. (Symposium paper; see also Benedict, Berens, Meyer, Post.)

This paper reports 88 patients upon whom 130 operations were performed, 28 tears and 11 disinsertions being found. The causes were myopia 8; trauma 24; tumor 4; and unknown 51 cases. The types of operation employed were cautery to the sclera 5; ignipuncture 23; injection of mercuric cyanide 3; diathermy 95; and sclerotomy 4. The visual results were: 33 improved (8 with vision of 6/9 or better), 48 unimproved or worse, and 7 not recorded. The visual fields were fully restored in 19, improved in 29, and unimproved or worse in 58. Anatomically, there was total reattachment in 22, improvement in 12, no improvement in 47, and no record of anatomical results in 7 patients. Ellett mentions the case of a one-eyed negro girl of 16 years who after four operations (two scleral punctures and two ignipunctures) was improved from ability to perceive light to vision of 6/6.

Ralph W. Danielson.

Kraupa, Ernst. **Transitory amblyopia.** Ophthalmologica, 1940, v. 98, Jan., p. 300. (See Section 9, Crystalline lens.)

Levy-Wolff, Lizzie. **The pathogenesis of retinitis pigmentosa (sclerosis pigmentosa chorioretinalis). 2. Local symptomatology.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 418-433.

Lewis, J. M., and Haig, C. **Vitamin-A requirements in infancy as determined by dark adaptation.** Jour. of Pediatrics, 1939, v. 15, Dec., p. 812.

Dark-adaptation tests were carried out in 53 infants ranging in age from 6 weeks to 13 months. They were divided into four groups whose diets varied in vitamin-A content from a high ratio down to one twelfth of that present in the average diet. Dark-adaptation tests were normal in all groups. From this it seemed unnecessary to supplement the average diet of infants with special vitamin-A preparations.

F. M. Crage.

Lijo Pavia, J. **Flat detachment of the retina and hole in the macula.** Rev. Oto-Neuro-Oft., 1939, v. 14, March, p. 73.

A case of flat detachment of the retina with a macular hole occurring in a 22-year-old female was observed over a period of two years. The patient had a positive Wassermann. The author reviews the recent literature of this and similar macular conditions, and suggests diagnostic aid in the recognition of such lesions. (Retinal photographs.)

Edward P. Burch.

Meyer, S. J. **Results of operations for detachment of the retina at the Illinois Eye and Ear Infirmary.** Surg., Gynec., and Obstet., 1940, v. 70, Feb. 15, p. 468. (Symposium paper; see also Benedict, Berens, Ellett, Post.)

A preliminary sketch of the retina and the location of the tear is always made. Anesthesia is by morphine and scopolamine hypodermic injection, and by injection of 2 to 4-percent novocaine retrobulbarly and subconjunctivally. Rectus muscles are controlled by bridle sutures. Special care is taken to keep the cornea moist. Localizing punctures are made and are observed with the ophthalmoscope. Atropine is instilled at each daily dressing. Both eyes are bandaged fourteen days, then pinhole spectacles are given and the patient is allowed up about the eighteenth day. Of 148 eyes operated upon, tears or holes were found in 35 percent and disinsertion in 3.3 percent. There was a history of trauma in 21 percent. Previous surgical operations on the affected eyes were noted in 28 cases and included lens extraction 22 cases, glaucoma operations 2, magnet extraction 2, and needling 2. Meyer reminds us that a surgical cure may still be a failure to the patient. Anatomically 37 percent were improved, functionally 34 percent. In private practice Gradle and the author have obtained successful results anatomically and functionally in approximately 60 percent of more than 260 operations. Ralph W. Danielson.

Post, L. T., and Sanders, T. E. **Operative results in detachment of the retina at Saint Louis Washington University School of Medicine 1934-1938.** Surg., Gynec., and Obstet., 1940, v. 70, Feb. 15, p. 450. (Symposium paper; see also Benedict, Berens, Ellett, Meyer.)

The authors object to the term "partial success." In their experience, practically none of the cases that are not flat within a few days after the operation will go on to reattachment. A case should be followed for a year before being considered a success. Forty out of 94 cases (42 percent) had complete surgical reattachment. Of the forty patients with complete reattachment 10, or 25 percent, had an excellent result with an acuity of 20/30 or better; 16, or 40 percent, had a good result with acuity of 20/40 to 20/70; and in 14, or 35 percent, only a fair result was obtained, the vision being 20/100 to 10/200. Twenty-six out of 94 cases, therefore, obtained vision of 20/70 or better. No reattachment occurred in nine aphakic cases. Early operation is important; in 18 of the 26 cases having vision of 20/70 or better, the operation was done in the first month. Multiple diathermy puncture was used in most of the cases, the highest percentage of cures being by means of the thermophore (8 successes in 23 cases, and in favorable cases 7 cures out of 9 cases). In the thermophore cases the subretinal fluid is removed by posterior sclerotomies, and aspiration, if necessary. The thermophore is then applied to the bare sclera for one minute, at

158 degrees. With a 3-mm. contact surface about 8 to 12 applications are made in the form of a barrage around and over the tear, a curved contact point being used posteriorly. (6 tables of statistics, 3 references.)

Ralph W. Danielson.

Rubino, A. **A large intraretinal cyst.** Boll. d'Ocul., 1939, v. 18, March, pp. 201-207.

Ten years after his right eye was hit by an apple a man of 32 years noticed diminution of central vision and some defect of the visual field. Examination showed a large globular formation located in the upper-temporal quadrant of the fundus. The cyst was immobile and semitransparent. The macular region was not visible. The round inner border of the cyst reached the corresponding edge of the papilla while the periphery could not be seen. The pathogenesis of the formation is discussed. (Bibliography, 2 figures.)

M. Lombardo.

Santoni, Armando. **The capacity of the retinal tissues to oxidize certain fatty acids and methyl esters of fatty acids in vitro.** Ann. di Ottal., 1939, v. 67, Nov., p. 845.

By means of the manometric method of Warburg the author has studied the capacity of the retina of the ox and of the rabbit to oxidize certain saturated fatty acids. In varying degrees the retina of either ox or rabbit oxidized the fatty acids employed, with the exception of formic, caproic, and oleic acids. These inhibited the respiration of the tissue. It was found that the methyl esters of the fats had a greater capacity for oxidizing the tissues than the free fats. While the author recognizes the fact that experiments in vitro cannot be unqualifiedly applied to organic retinal processes, he considers the results obtained as another step in the much disputed question as to the retrograde metamorphosis in the metabolism of the retina. He advances the view that the esters may be those normally found in the cells rather than those produced by the action of the enzymes in the lipoids and esters. (Bibliography.)

Park Lewis.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Bonnet, Paufique, and Blanc, H. **Bilateral optic atrophy in a congenital syphilitic.** Bull. Soc. d'Opht. de Paris, 1938, March, p. 176.

The condition was found in a 16-year-old girl, and is reported because of its rarity.

George A. Filmer.

Fischer, Franz. **The fundus in acute retrobulbar neuritis.** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 145.

Observations are based on 100 cases, 50 men and 50 women, who showed normal discs on admission. In one third of the cases multiple sclerosis was immediately ascertained, whereas in 10 cases no definite cause could at first be determined. In the further course 62 of the 100 cases presented papillary edema. The conclusion is reached that papillary edema is the usual phenomenon of acute retrobulbar neuritis, which is most frequently caused by multiple sclerosis.

C. Zimmermann.

Iles, A. E. **Optic atrophy following orbital cellulitis.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 464.

Optic atrophy developed within a week after the onset of an orbital cellulitis. The cellulitis was secondary to an

acute frontal-sinus infection and was operated upon on the third day.

Beulah Cushman.

Lamb, H. D. **The optic papilla in septic and chronic endophthalmitis.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 408-417.

13

EYEBALL AND ORBIT

Duthie, O. M. **Exophthalmic ophthalmoplegia.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 426.

Exophthalmic ophthalmoplegia is described as a disease of middle life more frequently affecting males. It may come on spontaneously or may follow a subtotal thyroidectomy at any time within from ten days to two years. The exophthalmos may be unilateral or bilateral and is always greater than in exophthalmic goiter. It is associated with edema of the upper and lower lids and with conjunctival chemosis. The eye movements most frequently affected are those of abduction and elevation, and the eyelids may show widening of the palpebral fissure or partial ptosis. Papilledema has been described. The general symptoms of thyrotoxicosis are slight in comparison to the severity of the exophthalmos.

Two cases are reported and the author concludes that the state of hyperthyroidism may be produced in man either by a continual stimulation of thyroid activity by the thyrotropic hormone in spite of the existence of normal conditions for the production of the antithyrotropic principle; or by the failure of this protective function in the presence of a constant or increasing animation of thyroid activity.

Beulah Cushman.

Charamis, J. S. **Craniofacial dysostosis (Crouzon's disease).** Ophthalmologica, 1940, v. 98, Jan., p. 305. (See Amer. Jour. Ophth., 1940, v. 23, May, p. 601.)

Haemmerli, V. **Sepsis and metastatic ophthalmia.** Schweiz. med. Woch., 1939, v. 69, no. 44, p. 1078.

The author reports a case in which after recovery from the sepsis all ocular symptoms disappeared. Staphylococcus was probably the etiologic factor.

Theodore M. Shapira.

Hardy, Guerdan. **Ocular symptoms in nasopharyngeal tumors.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 446-447.

Lewis, F. P. **Two rare cases of congenital anomalies of the eye with clinical implications.** Trans. Amer. Ophth. Soc., 1939, v. 37, pp. 358-367.

A case of aniridia with increased intraocular tension controlled by pilocarpine is reported. This leads the author to an interesting consideration of the pathogenesis of glaucoma and a plea that more of these cases be studied. Another case is presented of persistent hyaloid artery, fetal pectinate ligament of the iris, posterior capsular epithelium of the lens, and posterior cataract with calcification simulating blastoma retinae. There is a pathologic study of the eye with an embryologic interpretation by Ida Mann.

David O. Harrington.

Siegfried, Hildegard. **Causes of failure of the implantation of formalinized calf's cartilage into the orbit for artificial stump formation after enucleation of the eyeball.** Klin. M. f. Augenh., 1940, v. 104, Feb., p. 163.

This is a report of 42 cases operated upon at the eye clinic of Königsberg with 12 percent failures. Investigation revealed that the implanted formalin-

ized cartilage acted as a foreign body, becoming encapsulated by connective tissue. As the histologic changes and roentgen rays proved, processes of absorption gradually set in; this did not appear clinically. The cause of the failures may have been gradual atrophy from pressure of the conjunctival parts which covered the implant, or irritation by the implanted cartilage, partly as a result of infection during the operation. The following procedures are recommended: The pieces of cartilage must not be too large. Tenon's capsule and conjunctiva must form a thick stratum. The cartilage must be thoroughly washed in boiling water. In purulent conjunctivitis or panophthalmitis, implantations should not be used. In most cases the implantation furnishes a good stump and a good cushion for the prothesis. C. Zimmermann.

14

EYELIDS AND LACRIMAL APPARATUS

Blair, V. P., and Byars, L. J. **Paralysis of the lower lid and scleral scars and grafts.** Surg., Gynec., and Obstet., 1940, v. 70, Feb. 15, p. 426. (Symposium paper; see also Kirby.)

This article deals with the surgical principles and technique involved in the correction of the deformities mentioned in the title. (13 sets of figures, case reports.) Ralph W. Danielson.

Kirby, D. B. **Blepharoptosis; the technique of its surgical correction.** Surg., Gynec., and Obstet., 1940, v. 70, Feb. 15, p. 438. (Symposium paper; see also Blair and Byars.)

This paper analyzes the various types of surgery and gives a detailed account of the technique in different groups. The author emphasizes the fact that lid surgery for ptosis is sometimes imperfect and unsatisfactory. (30 figures, 27 references.) Ralph W. Danielson.

Marx, E. **The fluid layer before the eye.** Ophthalmologica, 1940, v. 98, Jan., p. 284.

The anterior surface of the eyeball is covered with an uninterrupted film of fluid which takes part in all its movements. It consists of two parts, one covering the eyeball and the other forming a meniscus between the eyeball and the eyelids. The movements of the fluid take place principally in the lower meniscus. The movement is not uniform and continuous, the fluid being propelled along the lacrimal line toward the nose in jerks. The prebulbar fluid is drawn up over the eyeball from the lower meniscus by winking.

F. Herbert Haessler.

Renard, G., Halbron, P., and Proux. **A case of ulcerative syphilis of the eyelids.** Bull. Soc. d'Opht. de Paris, 1938, March, p. 122.

Palpebral ulceration in a 39-year-old woman was found to be syphilitic and healed rapidly under antiluetic therapy.

George A. Filmer.

Tita, Carlo. **Palpebroconjunctival tuberculosis.** Ann. di Ottal., 1939, v. 67, Nov., p. 871.

The author describes in detail a case of palpebroconjunctival tuberculosis in a child of eight years. Beginning apparently as a hordeolum, there had been for about three years a tumefaction of the right upper-lid margin with a sanguineous crust which the mother had from time to time removed. Later the left upper lid became involved in a similar way. If preauricular glandular swelling had existed it had disappeared before the patient came under observa-

tion. All of the tests were positive and a section of the conjunctiva demonstrated the Koch bacillus. The author believes the infection to be of exogenic origin in a subject predisposed to tuberculosis. He discusses the various classifications of lid and conjunctival tuberculosis and believes that all, including the classic one of Sattler, are too schematic, as one form of the disease may readily pass into another. Treatment with 5-percent silver nitrate and 5-percent iodoform ointment gave relief until the child was sent to a sanatorium for the treatment of tuberculosis. (5 figures, 2 tables, bibliography.)

Park Lewis.

15

TUMORS

Anderson, J. R. **The prognosis and treatment of retinoblastoma.** Ophthalmologica, 1939, v. 98, Dec., p. 193.

Retinoblastoma is diagnosed before the age of four years in 80 percent of the cases. One fifth of the cases are bilateral and, in some of them at least, the second eye is affected independently. In the author's patient, enucleation of the more seriously affected eye was performed, but too late to prevent intracranial extension. If only one eye is affected it should be enucleated. If a tumor in an early stage is detected in the second eye, it may sometimes be successfully treated by radiation.

F. Herbert Haessler.

Asbury, M. K., and Vail, D. **Metastatic carcinoma of the iris.** Amer. Jour. Ophth., 1940, v. 23, April, pp. 402-408; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 215.

Iles, A. E. **Mixed tumor of the lacrimal gland.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 1, p. 464.

Mixed tumors of almost identical pathologic pictures were removed from two patients aged 25 and 82 years respectively.

Beulah Cushman.

Milaras, T. **Structural differences in intraocular tumors and their metastases.** Ophthalmologica, 1940, v. 98, Jan., p. 271.

Metastases of uveal tumors may differ from the primary neoplasm both as to cell form and pigment distribution. A pigmented uveal tumor may have unpigmented extensions, but pigmented metastases very rarely arise from unpigmented primary masses. In histologic preparations properly treated with silver salts, seemingly unpigmented tumors can be shown to actually contain pigment. A primary choroidal tumor with cells that appear sarcomatous may have metastases that consist of cells with epithelial characteristics. The metastases of retinoblastoma seem less capable of differentiation than the cells of the primary mass. While the primary tumor may form rosettes, the metastatic mass often has the structure of a spongioblastoma without rosettes.

F. Herbert Haessler.

Mistretta, R. **Epithelioma of the limbus.** Boll. d'Ocul., 1939, v. 18, March, pp. 211-216.

A woman 37 years of age for three months had been affected by a hard, movable, pinkish neoformation on the sclera. The excised tumor proved to be a spindle-cell epithelioma. (4 figures.)

M. Lombardo.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
640 S. Kingshighway, Saint Louis

News items should reach the Editor by the twelfth of the month

Deaths

Dr. John Henry Connaughton Gallagher, Chicopee, Massachusetts, died March 18, 1940, aged 58 years.

Dr. George James Alexander, Bala-Cynwyd, Pennsylvania, died February 24, 1940, aged 64 years.

Dr. William Evelyn Hopkins, Los Angeles, died February 27, 1940, aged 75 years.

Miscellaneous

The home study courses in the fundamentals of ophthalmology and/or oto-laryngology that will be conducted by the American Academy of Ophthalmology and Oto-Laryngology will start on August 1, 1940. Registration must be made through the executive secretary, Dr. W. P. Wherry, 1500 Medical Arts Building, Omaha, not later than July 1st.

The University of Rochester School of Medicine and Dentistry, Rochester, New York, announces the Eleventh Annual Summer Graduate Course in Ophthalmology July 29 to August 2, 1940, inclusive.

The course entitled "A survey of eye conditions" (4 points credit), to be conducted by an ophthalmologist, will again be available to students planning to attend New York University summer session.

This course has been offered by New York University since 1932 in coöperation with the Bureau of Services for the Blind, New York State Department of Social Welfare. Material offered in this course designed for workers in the fields of education, social welfare, nursing, and allied fields aims to give a knowledge of eye conditions as related to problems of general health and welfare with emphasis on the need for sight conservation and preventing blindness. (It is the conservative opinion of leading ophthalmologists that 75 percent of blindness is unnecessary.)

For program giving outline of lectures please write to: Miss Ruth McCoy, Bureau of Services for the Blind, New York State Department of Social Welfare, 205 East 42nd Street, New York, New York.

The National Society for the Prevention of Blindness has announced that it is coöperating with the following colleges and universities in offering, at their 1940 summer sessions, courses for the preparation of teachers and supervisors of sight-saving classes:

Oregon State System of Higher Education, Portland, Oregon (elementary course). June 17th to July 26th. Director of the course: Miss Olive S. Peck, Supervisor of Sight-Saving, Cleveland Public Schools, Cleveland, Ohio.

Wayne University, Detroit, Michigan (elementary course). June 24th to August 2d or July 1st to August 9th. Director of course: Miss Margaret M. Soares, Supervisor of Braille and Sight-Saving Classes, Detroit, Michigan.

State Teachers College, Buffalo, New York (elementary course). July 1st to August 9th. Director of course: Miss Matie M. Carter, Associate Supervisor, Physically Handicapped Children's Bureau, State Education Department, Albany, New York.

University of Minnesota, Minneapolis, Minnesota (advanced course). June 17th to July 26th. Director of the course: Mrs. Winifred Hathaway, Associate Director, National Society for the Prevention of Blindness, 50 West 50th Street, New York, New York.

Details regarding the courses may be obtained from the university or college, or from the director in charge of the course.

Societies

The fourth regular meeting of The Montreal Ophthalmological Society was held at the Hotel Dieu Hospital on Thursday evening, April 11th, at 8:30 p.m. The election of officers for the next two years was held. Dr. J. Rosenbaum of the Royal Victoria Hospital was elected president and Dr. L. Tessier of the Hotel Dieu was elected secretary-treasurer.

At the annual meeting of the Chicago Ophthalmological Society, held on April 15th, the following officers were elected: president, Dr. Richard C. Gamble; vice-president, Dr. L. J. Hughes; secretary-treasurer, Dr. Vernon Leech; councilor, Dr. L. J. Hoffman; corresponding secretary, Dr. Robert von der Heydt.

Personals

Dr. Wendell Hughes presented a motion picture on "Plastic surgery of the eye, correction and reconstruction of lid, and transplantation of lashes," before the Manhattan Eye, Ear, and Throat Hospital, Department of Ophthalmology, graduate instruction to the Resident Staff, on Thursday, May 9, 1940.

Dr. Glenn L. Walker is now associated with Dr. C. A. Young in the practice of ophthalmology, Suite 409 Medical Arts Building, Roanoke, Virginia.

The following note has just been received. The Journal congratulates Dr. and Mrs. Weeks on this happy occasion.

"On April 29th, Dr. and Mrs. John Weeks celebrated their golden wedding anniversary surrounded by friends and well-wishers in Portland, Oregon. There was a reception at the Town Club in their honor, to which over 400 guests came. This was preceded by a dinner at the club. Those at the dinner besides the golden-wedding couple were their son-in-law and daughter, Dr. and Mrs. Frank Mount, and their six charming children; Mrs. Weeks's sister and her husband, Mr. and Mrs. J. Todd, her sister having been her bridesmaid 50 years ago; Dr. Weeks's nephew and his wife, Dr. and Mrs. Carroll Weeks; Dr. Edward Jackson; Dr. Hume Roberts and wife, of Pasadena; Dr. and Mrs. Hans Barkan of San Francisco.

Dr. and Mrs. Weeks were in the best of spirits and health, and received the felicitations of their friends until late into the evening.

Although Dr. Weeks had been up all that day, and until late at night, he telephoned at eight o'clock the next morning to Dr. Hans Barkan, to ask him to meet him and Dr. Jackson at nine-thirty that morning at the new medical school and library of the University of Oregon.